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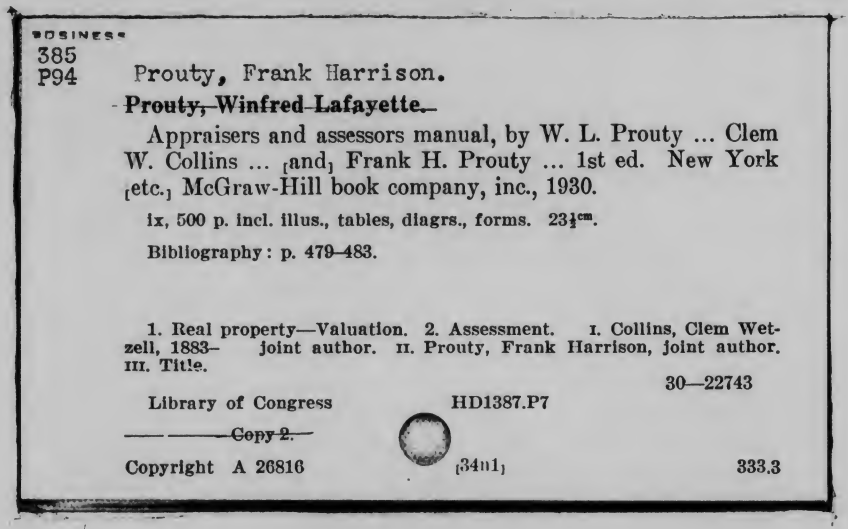

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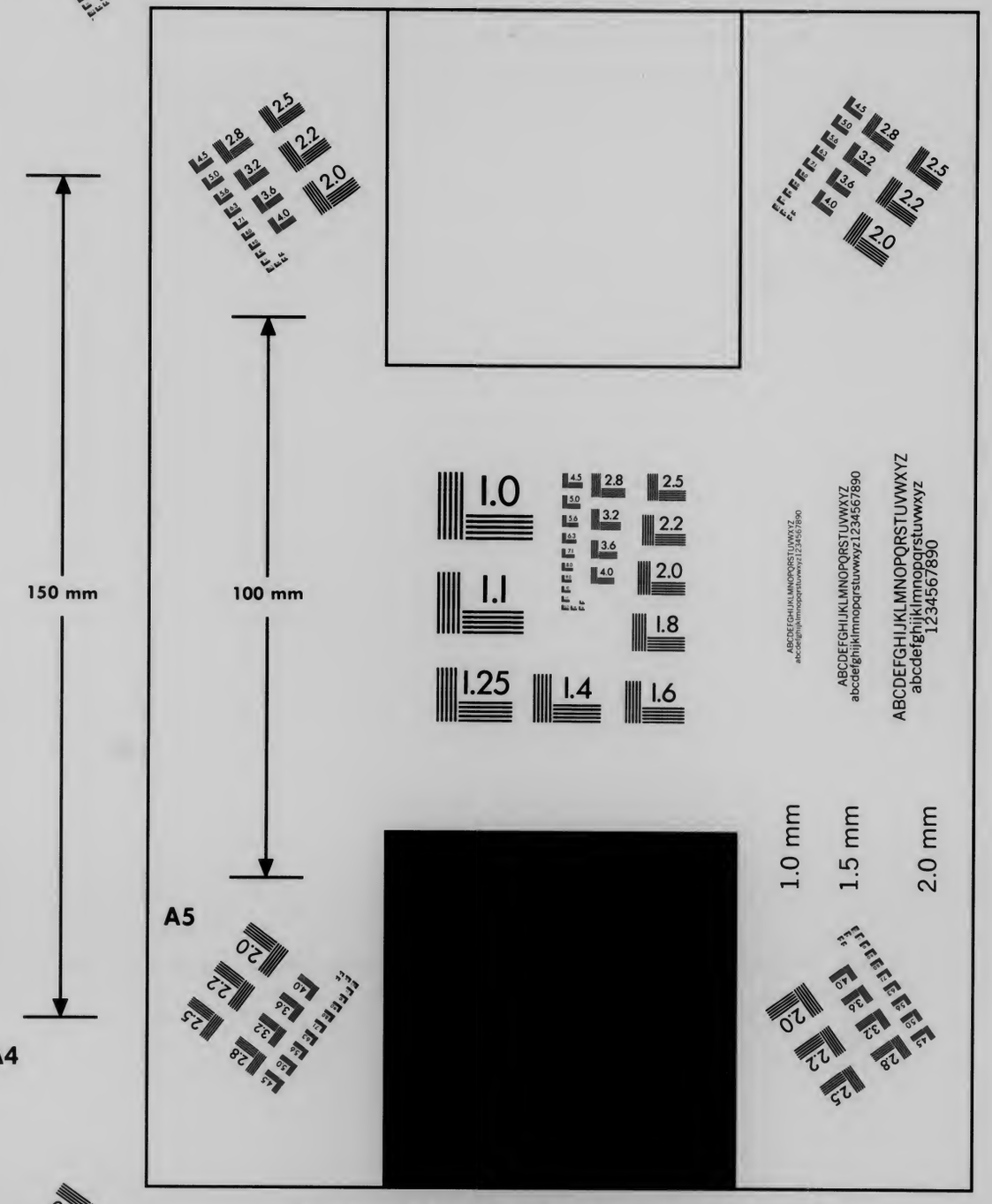

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APPRAISERS AND ASSESSORS MANUAL

APPRAISERS AND ASSESSORS MANUAL

BY

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PREFACE

To those who are engaged in the study and the practical application of scientific principles to the valuation of property, this book is submitted. In many ways it is a pioneer in its field. It is not the function of this book to impress the reader with the need for scientific valuation of property. We believe such a fact to be universally recognized. To the student of taxation and to the practicing assessor and appraiser, we believe the principles of valuation contained in this book will be of great assistance in developing improved methods which have so long been greatly needed.

The value of much of the information has been proved by the experience of men in a wide field of endeavor, each of whom is eminent in his own chosen vocation. Only through the experience of the individual can we, as a whole, advance. The need for information still is great, and it is the sincere desire of the authors to become mutually interested with those seeking further information, advancement and development along these lines.

This book is written to meet the needs of the practicing assessor and appraiser, but also may be found useful by the banker, realtor, architect and engineer and by other executives who are interested in methods by which property values can be determined. It is the aim of the authors to place before their readers information which will enable them to develop a system for the valuation of property. Conditions vary throughout the United States. Structures differ in type, use, cost, life and depreciation; but, nevertheless, the general principles which are propounded in this book can be applied to meet every need for correct valuations.

Scientific appraising for taxation purposes does not demand the exactness of detail found in the unit cost system for appraising individual properties, where the value is theoretically correct to the last dollar. The wholesale valuation of property will not permit such refinement. Furthermore, the application of scientific formulas to the valuation of individual properties in the

revaluation of an entire community gives, with speed and precision, results within the limits of allowable error.

Confronted as we are with the serious conditions which exist today, it is the sincere wish of the authors that the scientific principles laid down in the following pages may be uniformly helpful to all who are interested in the improvement of present conditions and in the application of approved rational methods to the principles of property assessment for taxation purposes.

We sincerely hope that this book may fill a long-felt need. We seek cooperation and suggestions from our readers for future editions of the book. To the many city officials, tax officials and others who have contributed data used in this book, we are deeply grateful.

THE AUTHORS.

DENVER, COLO.
April, 1930.

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APPRAISERS AND ASSESSORS MANUAL

CHAPTER I

TAXATION AND VALUATION

Taxation a Perpetual Problem.—Since the beginning of organized society, taxation has been a matter of vital interest to the individual as well as to the state. It has directly influenced the careers of statesmen, the successes of political parties and even the rise and fall of nations. The subject of taxation has been studied, debated and experimented with, and, throughout all the ages, it has failed of its purpose more than any other political theme. Today we find the nations of the earth still seeking a system of taxation which rightly divides the cost of government amongst individuals.

More than a century ago Alexander Hamilton said: "No part of the administration of government requires for its proper management such extensive information and so complete a knowledge of the principles of political economy as the business of taxation." So as civilization progresses and political and economical changes take place, theories of taxation must also progress to meet those changing conditions.

Modern Needs in Taxation.—The first quarter of the twentieth century has witnessed a remarkable growth in the development of business and industrial enterprises along scientific lines. The World War demanded cooperative effort and the systematizing of every part of governmental as well as individual activities. Standardization in manufacture, efficient methods in operation and construction and systematic buying and selling have become keynotes in the nation's business; and in this new era big business has taken the lead aided by governmental advice, yet certain governmental agencies have largely failed to apply these principles to their own advantage.

Government and Taxation.—A weakness of the American system of government from the standpoint of efficiency of administration, though commendable from the more fundamental consideration of freedom and democracy, is the independence of local governmental units. Certain basic laws are adopted by the federal government and the state for the regulation of its citizens and smaller units of government, but these are so broad in their application that almost complete autonomy is given local governments. The result of this system is that each taxing unit adopts its own methods of raising public revenues; it seldom profits by the experience of the past or of other commonwealths; and too frequently it is influenced in its methods by consideration of policy and political expediency rather than science, economy and equalization.

The Assessor.—Heretofore, too little thought relative to his ability to judge values, equalize taxes, and determine results without fear or favor has been given to the qualifications of a candidate for the office of assessor. The choice of an assessor has been from a political rather than from a practical standpoint. The lack of scientific methods has resulted in taxation systems tainted with personal graft and political favor.

The taxpayer who complains feels that luck has not favored him, and criticizes the assessor who is compelled to render a decision for which he generally lacks definite proof.

Taxation is a balance, on one side of which is the mill levy and on the other the percentage of full valuation. If the valuation goes up the levy goes down, and if the valuation is decreased the levy is increased. There would be but little need of a Board of Equalization if a definite practical system of taxation were uniformly applied.

Need of Trained Assessors.—Roger Babson, statistician, states that systematization in public office is one of the great needs of the day. The cry "taxation without representation" gave birth to a new nation, but it did not provide for that nation ways and means whereby the individual shared justly and equally in the burden of taxation which he had taken upon himself. Time has not eased the burden, for today it is the greatest problem confronting the American people.

Our present political taxing system is largely at fault. Our taxing officials, who are elected or receive political appointment, are subject to the caprice of popular approval or prejudice.

Their short terms in office are given over to familiarizing themselves with records handed down by their many predecessors and striving to ease the unjust burdens of a skeptical electorate. To devote time or thought to the systematic development of an equalized system of valuation is seemingly impossible, and the necessary funds are not provided by unsympathetic fellow officials. Meritorious service will not necessarily bring its just reward of retainer in office, and as a result we find many of our present taxing officials still using the old and obsolete "guess system" for establishing property valuations.

Today we can see a new awakening. The highly complex life in every municipality with its heavy burden of taxation brings with it a tremendous demand that taxes be levied equitably. This condition has awakened a public conscience which reflects itself in the desire of elected tax officers to study and improve upon the methods of valuing and assessing property and levying and collecting taxes. As a result of this comparatively recent movement we find great national organizations such as the National Tax Association, the National Association of Real Estate Boards and the National Association of Building Owners and Managers giving the subject serious thought and study and securing results which tend to advance the whole science of valuation and taxation methods.

Need of Modern Systems.—Nevertheless, modern systems with definite rules and systematic methods are the exception rather than the rule. In one of the most populous central states, test figures have shown that assessed valuations run from 1 to 200 per cent of true value. In one of the Rocky Mountain states the valuations in one county average 40 per cent of true value and in the adjoining county 98 per cent of true value. Unfortunately, the citizens in the 98 per cent county are by far the least able to meet their tax obligations. In one of our large western cities it was found that land values had not been changed on the tax rolls over a period of 20 years, and the machinery in certain manufacturing plants was assessed on a 300 per cent valuation. In a city of 15,000 population where a scientific revaluation of property was recently made, the cost of the reappraisal was paid for by the addition of properties to the tax rolls which had heretofore escaped taxation.

Scientific Appraisal Pioneers.—The first real effort toward scientific land appraisal was made by Judge Murray Hoffman,

in 1866, when he devised a rule by which the various portions of a parcel of land could be appraised. In 1910 the city of New York developed a system for appraising property using the Neill rule for land valuations and a square-foot basis for determining building values.

One of the most notable forward steps in scientific appraising was made in 1910 by John A. Zangerle, member of the Board of Appraisers for the city of Cleveland and Cuyahoga County assessor, who, in collaboration with W. A. Somers of St. Paul, developed the Cleveland system for land and building appraisals. This system has been widely used during recent years by other municipalities.

In 1915 the city of Buffalo resubdivided the city into tax districts, and at the same time adopted a scientific appraisal system which has proved very successful. As a result of the appraisal in Buffalo, the railroad property alone was increased $3,000,000 and from 1915 to 1923 the valuation of railroad property was increased from $43,000,000 to $88,592,280. The increase in 1915 in value of land was $35,000,000, and in 1927 the total increase was $143,000,000 which resulted in a tax reduction from $29.84 to $21.67 per $1,000 of valuation.

Another notable step was taken by the city of Los Angeles and the county of Los Angeles in 1915 and 1916 when the city and county combined in reappraising property. Previous to that time both the city and county made separate appraisals of Los Angeles city property. These dual appraisals gave conflicting and unsatisfactory results. Notable progress has also been made by the cities of Rochester, Jersey City, St. Paul, Minneapolis and Denver.

In striking contrast to the cities heretofore mentioned is the city of Chicago, where, in 1928, the errors in valuation and assessment were so great that the Illinois State Tax Commission ordered an immediate reappraisal to remedy the situation.

In 1924 a committee of the Illinois Association of Real Estate Boards reported that "the present system of making assessments by township assessors is the cause of unfair assessments." Only two counties in Illinois have county assessors. In each of the other 100 counties of the state there are from 10 to 20 assessors holding positions that are underpaid and all working without any uniformity or guidance.

Lack of Uniform System among Cities.—The need for a more uniform system of making assessments throughout the entire United States is strikingly illustrated by the following instances, some of which are due to administration and some to the lack of uniformity of tax laws. C. E. Rightor of the Detroit Bureau of Governmental Research gives the following information relative to comparative tax rates for 215 cities in the United States and Canada for the year 1926 having a population of 30,000 and over:

Fifteen cities, or 7 per cent assess at less than 100 per cent of full value. The legal basis for assessment in Birmingham and Phoenix is 60 per cent; in Chicago, Seattle, San Antonio, Spokane, Peoria, Little Rock, Springfield, Ill., Oak Park, Ill., Joilet, Ill., Rock Island, Ill., Moline, Ill., Bloomington, Ill., is 50 per cent. In Charleston, S. C., 42 per cent; in Minneapolis, Duluth and St. Paul, 38 per cent (average); in Sioux City, Iowa, 25 per cent and in Augusta there is no legal basis for assessment. Kansas City assesses at 100 per cent for state, county and school purposes and at 70 per cent for city purposes. Portland, Ore., assesses land at 75 per cent; improvements at 50 per cent; personal property and retail businesses at 50 per cent; and wholesale businesses at 60 per cent. In Pittsburgh no personal property is assessed and no state tax levied on real estate. In California among the 58 counties of the state the percentage of assessed value to full value varies from 25 to 66⅔ per cent. In Baltimore new subdivisions are assessed at 76 per cent of the city rate. In New York two adjoining counties showed a difference of $24,000 per mile in assessing the same railroad. In Virginia the ratio of assessed value to full value varies from 32 to 83 per cent in the incorporated cities, and within most of the cities it varies from 10 to 100 per cent. In the 36 counties in Oregon the ratio varies from 42 to 87 per cent. In a report of a special committee for the state of New York we learn that "In one county every town is assessed at 21 per cent of full value or under, and in 33 out of 62 New York counties 133 towns are assessed at less than 50 per cent of full value.

Detroit is required by city charter to separate valuations on lands and buildings, whereas such is not required throughout the state of Michigan where only one combined valuation is made. Minnesota assesses iron ore, mined or unmined, at 50 per cent of full value; household goods, furniture, wearing apparel and personal property at 25 per cent; livestock, agricultural products, merchandise, together with furniture and fixtures used therewith, manufactured products and all unplatted real estate at 33⅓ per cent. All property not included within

the three preceding classes at 40 per cent. Furthermore, the Minnesota Supreme Court held that "unplatted lands" were not to be strictly construed and that such words were employed to "distinguish between urban and suburban property and the uses to which each naturally is adapted as agricultural and non-agricultural."

Lack of Uniformity in Appraisal Methods.—In the 1924 report of the assessor of St. Paul he states:

> The self-styled tax adjuster invariably carries his case direct to the court, ignoring the Tax Commission, thereby postponing the payment of taxes from one to two years, and, if successful in having the value reduced, cancels all penalties and costs. It seems always possible to secure the services of so-called "experts," who appear willing to testify to any value desired. These cases often obstruct the courts, the conflicting testimony making it difficult for the judges to decide, and perhaps result in the unfair advantage to one taxpayer and the upsetting of many values. This system has cost the county over $15,000 in the past three years for property examinations and witness fees, adding that amount to the tax burden of willing taxpayers.

In 1926 W. F. Connelly, tax assessor, Bridgeport, Conn., in a report published by the Connecticut Tax Commission says:

> In Connecticut a half dozen towns prior to 1925 installed systems to some extent similar to the one proposed for Bridgeport, and in the year 1925 a half dozen other towns made revaluations based on unit values and employing arithmetical computations as a basis for arriving at values. The installation of such a method involves the complete overhauling of methods previously employed in tax offices. By these methods proposed values for purposes of taxation are not arrived at by guessing or by the rule of thumb. The need in many communities of this state for reconstruction of their plans for raising money to meet their budget requirements is very pressing. In one case a lot worth approximately $4,300 had been omitted from the tax list for a number of years. The valuation of buildings has been unscientific and therefore lacking in uniformity and accuracy. One house was given a value of $4,000, another next door identical in every respect was assessed at $7,100. Again, two houses, outwardly much alike, were assessed at approximately the same amount, yet the cost of one exceeded the cost of the other by several thousand dollars. A fair valuation of buildings is possible only by detailed inspection of the premises and by the use of definite standards.

The foregoing instances are only a few that have been chosen from many. They are not to be considered as reflections on these municipalities, for they represent the general condition existing today in most of the commonwealths of the United States.

U. S. Government Valuations.—The federal and state income and inheritance tax laws and regulations, the revaluation of railroads by the Interstate Commerce Commission and the Hoover plan of applying scientific principles to fundamental business and political problems mark an epoch in the advancement of scientific thought and have greatly influenced the present tendency to advance taxation methods from the realm of "guesswork" to the plane of science, based upon engineering principles of system and accuracy. The principles of valuation that these governmental agencies have applied to the individual and the corporations have not been applied generally by local governments in the equalization of taxes.

The systematic reappraisal of property is more an ethical than a fiscal problem and does not concern the increase or decrease of revenue. It does concern the establishing of an equitable and practical system for securing revenue.

At a recent meeting of the National Association of Real Estate Boards they recommended:

> An amendment to all state constitutions, most of them exceedingly antiquated, so as to remove restrictions or to permit the legislature to classify property for the purposes of taxation. Ironclad and outgrown constitutional restrictions are found to be the greatest obstacle to tax betterment.

Need of Manual.—John A. Zangerle states that a manual should be prepared for securing uniformity of method by assessors. Outside of two or three of our larger cities such a manual is conspicuous by its absence.

Henry F. Long, commissioner of corporations and taxation of Massachusetts, states:

> It is not strange that under such conditions the assessor longs for a measure, much in the nature of a yardstick, that will always accurately reflect the just value of all property. He finds no such measure and must rely upon his own judgment. As time goes on the demand for equality and fair values will become more pronounced. Valuation "guesswork" or valuation by "expediency" to meet local or political or other conditions will not be countenanced.

CHAPTER II

FUNDAMENTAL PRINCIPLES OF SCIENTIFIC ASSESSING

Qualifications of Assessor.—In considering the subject of fundamental principles underlying scientific assessing methods, we must look first to the qualifications of the assessor and his deputies. It is imperative that they be men who are fundamentally honest and conscientious in the performance of their duties. The assessor's greatest obligation is to secure equity in assessments, irrespective of political, religious, fraternal or other associations. He must work without fear or favor and be aggressive and willing to undertake the job of improving any present system of taxation. "Guessing" and "rule of thumb" systems must be replaced by a rational system for determining correct valuations. A background of common sense is necessary, and the assessor should always keep in mind that he must seek reasonable conclusions to cover the exceptions to any established system of rules.

Cooperation with Others.—A spirit of cooperation with all officials, business organizations and others interested in tax matters is a great asset and should always be encouraged. One of the greatest privileges of any assessor is to enjoy the full and loyal cooperation of the local press in helping him inform the public as to his plans in behalf of equality of assessment, which will give justice to every taxpayer. To the citizen who believes a discrimination has been made concerning his assessment, a courteous and satisfactory explanation should be made of the principles involved in arriving at his assessment figure.

The Successful Assessor.—The work in every assessor's office involves such a tremendous volume of detail, especially in the larger cities, that the field and office work must be left largely to deputy assessors. If the assessor is to make a success of the work which he undertakes, it is important that he should have associated with him a group of employees who, first of all, are loyal to him and the principles for which he stands. It is

essential that these employees know every detail of the work assigned to them, and that they have a vision of great public service, efficiently and courteously rendered, conducive to correct and satisfactory results. The success of any assessor's administration must depend largely upon the loyal service and the faithful cooperation of well-trained employees. Placing the assessor under civil service is an advanced step for which much may be said, but one which few cities have considered with favor.

Class for Assessors.—One of the best methods for developing the entire organization into an efficient working unit is the establishment of an assessors class. The effectiveness of this method has been well demonstrated in a class conducted in 1924 and 1925 by one of the authors, which was sponsored by the Denver school board. The class sessions were held two evenings a week in the Evening Vocational High School. Fundamental training was given in plan reading and estimating, classification of buildings, building ordinances, building construction, building labor and material costs, material classification, construction methods, age and depreciation of buildings, valuation of buildings, obsolescence of buildings, land valuation, valuation of mechanical and electrical equipment, valuation of personal property, stocks and bonds, household goods, appraisal methods, field systems, record systems, taxation laws and methods, charts, city growth, surveys and subdivisions.

One of the best features of the class consisted of lectures given by well-known business men among which were the following:

Lecture Subjects:

1. The History of Assessments in Denver, by a former mayor and assessor who was instrumental in securing the services of W. A. Somers for revaluing the business section of Denver in 1910.
2. The History of Taxation, by a university dean.
3. History of Land Values in Denver, by a former president of the Denver Real Estate Exchange.
4. The State Tax Commission, by its president.
5. Ideals in Taxation, by a member of the State Tax Commission.
6. The Use of Lumber in Building, by one of Denver's largest lumber dealers.
7. Brickwork, by one of Denver's largest brick contractors.
8. Uses and Costs of Steel in Buildings, by one of the largest steel fabricators in Denver.
9. Millwork, by a representative of Denver's largest mill.

10. Modern Plumbing, by instructor in plumbing courses in Denver Opportunity School.
11. Celotex, by a representative of the Celotex Co.
12. Terra Cotta, by a representative of the Northwestern Terra Cotta Co.
13. Insulex, by a representative of the Intermountain Insulex Co.
14. Cinder Block, by a representative of the Cinder Block Co.
15. The Use of Concrete in the Building Industry, by a representative of the Portland Cement Manufacturers Association.
16. New Building Materials, by a building supply dealer.
17. Estimating the Cost of Buildings on the cubic-foot basis, by a well-known architect.
18. The Cost of Buildings, by an architect.
19. Residence Costs, by an architect representing the Architects Small House Service Bureau.
20. The Cost of Buildings, by Denver's largest building contractor.
21. The New Building Code, by the city building inspector.
22. The Valuation of Real Estate, by a realtor.
23. Depreciation and Appreciation of Property, by a realtor.
24. Appraisal of Household Goods, by a representative of one of the largest furniture stores.
25. Taxable Securities, by an expert bond dealer.
26. Taxation of Special Improvements, by the manager of improvements and parks, city and county of Denver.
27. Appraisals, by a U. S. inheritance tax appraiser.
28. Appraisal of Mechanical and Electrical Equipment, by a representative of a national appraisal company.
29. Zoning in the City of Denver, by the secretary-engineer of the City Zoning Commission.
30. City Planning, by a city planning engineer.

These lectures were given from time to time throughout the course, and the speakers were generally willing to give information fully and freely from the wealth of their experience. The value of these lectures cannot be overestimated and are mentioned here as suggestions for the development of an educational program in other cities which may be considering a reappraisal.

Building Material Exhibit.—A permanent exhibit of various building materials should be secured in connection with the class work and be made a permanent adjunct to the assessor's office. Such an exhibit is helpful in educating the assessors as to the various kinds of materials which go into every type of building and would aid them in answering correctly the many descriptive questions which are listed on the record cards.

Local Assessor's Manual.—One of the first tasks of every assessor should be the compilation of a local "Assessor's Manual," which would serve as a rule and guide for the conduct of his

office. Every local manual should contain the following information, and in addition such other local information as may prove helpful in the administration of the office:

1. Roster of tax department, including Board of Equalization and Tax Commission.
2. Roster of local boards of advisors.
3. The assessor's yearly calendar giving all fixed dates established by law which govern the levying and collecting of taxes, delinquent taxes, penalties, tax sales, etc.
4. An index of state, county and local laws dealing with taxation.
5. State, county, school and local tax levies and how levied.
6. Assessed value, tax levy and funded debt showing variations from year to year.
7. Property assessed by State Tax Commission as public utilities, etc.
8. Statutory exemptions in real and personal property.
9. Rules for governing office procedure, including a chart of the organization.
10. Procedure in handling complaints, etc.
11. Maps of assessment districts.
12. Field instructions for deputy assessors.
13. Instructions for filling out field and office record cards.
14. Method of using records of sales, transfers, rentals, loans, advertisements, leases, etc.
15. Land values, rules, formulas, tables, charts, etc.
16. Definitions of architectural terms.
17. Land surveys and subdivisions.
18. Building classification, cubic-foot costs, costs of various types of buildings, life of buildings, physical depreciation, obsolescence, utility depreciation, classification and cost of building extras.
19. Valuation of improvements.
20. Valuation of machinery.
21. Valuation of automobiles.
22. Valuation of household goods, office equipment, etc.
23. Valuation of personal property.
24. Valuation of money, notes and credits, stock and bonds.
25. Decimals of foot to each $\frac{1}{8}$ in.
26. Chart for reducing square feet to acres.

Cooperation with Business Men.—The assessor will find it very helpful to have associated with him representative committees from the local business and professional organizations with whom he may consult from time to time, relative to certain matters in which they are mutually interested. Advisory committees from the real estate exchange, chamber of commerce, service clubs and organizations of architects, contractors and

engineers can be of great assistance in helping the assessor solve problems which arise.

Information for the Public.—It is well, also, for the assessor to publish, for the use of the public, a small pamphlet setting forth the budget levies and assessments for various purposes, the outstanding city debts, the laws relating to payment of general, delinquent and special taxes, distribution of taxes, departmental expenditures and the procedure for readjustment of assessed values. The assessor should determine the value of property exempt from taxes and publish a classified summary of such property.

The education of the public is an essential step whenever a change in method is undertaken by the assessor. A full and simple non-technical explanation should be given the taxpayers. The press should be utilized but subjects requiring accurate statements of facts should be presented in formal statements from the office of the assessor. If the subject discussed is not of general interest but applicable to a limited group, and the necessary finances are available, it may be more desirable and effective to publish a pamphlet setting forth a full explanation of the subject with illustrations. Such a publication is especially suited to the reappraisal of land, where a booklet may be published showing by means of maps the base values of all land under the jurisdiction of the assessor.

In addition to the printed pamphlet, every opportunity should be accepted to address groups of citizens on the problems of the assessor's office. Instances are known where assessors, in the face of bitter opposition on the part of the press, have undertaken radical changes resulting in heavy increases of taxes to large numbers of taxpayers and have literally "sold" the plan to the public by means of speaking campaigns.

Full Value Assessments.—One of the greatest needs of present-day taxation is the assessment of all property at full value. Students of taxation, national trades organizations and taxing officials are generally agreed that any assessment made on property for the purpose of taxation should be made on the basis of 100 per cent value. Full cash value has been defined by the courts as "the cash price which a willing buyer, who is not compelled to buy, will pay a willing seller, who is not compelled to sell."

Real equalization is not reached by using a percentage of full valuation which is inexcusable, because in order to obtain any

percentage full value must first be determined. True comparisons between tax levies can be made only when all assessments are referred to a 100 per cent valuation basis. Where state laws fix the assessments on various classes of properties at various percentages of full value, such laws are a detriment to the practice of honest assessing and are conducive to fraud and incompetency on the part of the weak assessor and render the task of the strong, conscientious assessor, difficult indeed. Upson and Rightor[1] state: "Unless property is assessed at its full value as defined by state law or charter, there will always exist loopholes for under- or overassessment. It is impossible to compare the equity of assessing unless such uniformity is enforced."

The National Association of Real Estate Boards went on record as follows: "We adhere to the proposition that there can be but one fair basis of property for taxation and that is full, fair cash value."

Separation of Land and Improvements.—Another important fundamental principle of scientific appraising is the separation of land and building values. This separation is required by law in most of the states, and common sense should require it elsewhere. Land values and building values are subject to entirely different conditions. Land may increase in value and buildings decrease in value, a condition which is reflected in most consecutive yearly valuations. Entirely different methods are used in the valuation of land and buildings which cannot be logically and uniformly combined to produce equitable results.

A complete and comprehensive system of formulas, tables and charts is essential for the valuation of land. These are discussed in Chap. XXII. For building classifications, the life in years, annual physical depreciation, cubic-foot costs for various grades of construction, descriptions and pictures of typical buildings are necessary. These are given in Chaps. V to XIX inclusive.

Local Data.—Any plan of systematic reappraising requires the detailed examination of every property when the system is installed and periodically thereafter depending upon local law and other requirements. Revaluations may be made at intervals varying from one to five years. The more frequently they are made the more accurate they will be.

[1] Upson and Rightor, "Standards of Financial Administration," National Municipal League.

Variations in local cost of building materials and labor over a term of years, dating back as far as possible, should be secured in order to help determine relative building values. A study of the life and physical depreciation of every type of building to be appraised, as well as the factors of obsolescence and zoning, is important in any appraisal system.

In the chapters which follow the authors have endeavored to assist the assessor in the development of a system which will meet his own local individual needs rather than lay down a fixed system of definite rules universally applicable to every locality.

CHAPTER III

DETERMINING BUILDING AND LABOR COSTS OVER A PERIOD OF YEARS

Present-day Reproduction Cost.—In the appraisal of buildings a knowledge of the relative cost of labor and materials over a period of time is important in order to check the computation of the present reproduction cost of an old building, when the original construction cost is known. All building values for purposes of assessment are determined on the basis of a present-day reproduction cost less physical and obsolescent depreciation.

A building costing $10,000 in 1920 would cost about $8,000 today. To assess the 1920 building at 125 per cent of the present reproduction cost would be unfair. A study of the trend of building costs has been made by a number of technical magazine publishers and corporations among which are the following:

The American Contractor.
Engineering News-Record
American Appraisal Co.
F. W. Dodge Corp.
U. S. Department of Commerce.
U. S. Department of Labor.
Engineering and Contracting
S. W. Strauss Co.
Associated General Contractors.
Aberthaw Co.

1913 Basis Equals 100 Per Cent.—It has become standard practice to compare all building costs with the year 1913 as a base with 1913 costs equal to 100 per cent. The year 1913 has been selected because it was not subject to abnormal conditions precipitated by the World War, and because it marks the end of a period of years during which time normal prices prevailed with only small average yearly increases and decreases taking place. March 1, 1913, has been selected by the U. S. Department of Internal Revenue as the basis for all valuations used in the computations for income tax.

Need for Local Cost Charts.—Excellent as are all the charts and curves that have been published by various organizations for comparative cost purposes, few, if any, are suitable for use in local assessment work. Each chart was made for a special purpose using certain specific and limited data and designed for the use of the general public in every part of the United States. These charts should not be used, because:

1. The fluctuations in the cost of materials and labor varies throughout the United States.
2. The weights of influence given to various building materials and classes of labor vary throughout the United States and also within the building industry itself.
3. Labor efficiency is not considered.
4. Every factor that goes into the construction of a building is not considered.

Statistics show that the cost of building has fluctuated the most from 1913 to the present day in the Atlantic Coast states, and that the smallest amount of fluctuation has occurred in the Rocky Mountain states. The highest index figure in the Atlantic Coast states is 295; whereas the highest index figure in the Rocky Mountain states is 236. Both of these index figures occur in 1920. Up to 1924 the labor cost lagged behind the increased cost of buildings, but since 1924 the labor index has assumed the lead. On July 1, 1928, for 20 cities in the United States, the ratio of the highest to the lowest cost for labor and for material as given by the U. S. Department of Commerce is shown in Table 1:

TABLE 1.—LABOR AND MATERIAL COSTS

Item	Ratio, per cent,
Bricklayers	127
Carpenters	212
Structural ironworkers	175
Common labor	362
Common brick	200
Portland cement	166
Common boards	305
Sand	370
Structural steel	167

Statistics furnished by the *Engineering News-Record* and The American Appraisal Co. show that the maximum variation in cost index figures from 1913 to 1928, among all classes of construction, amounts to 30 points in the Atlantic Coast states and 45 points in the Pacific Coast states.

These facts show that fluctuations in building costs are not uniform for short periods of time in every part of the United States, and they are always subject to specific local conditions. In dealing with specific local conditions, we will consider several of the most popular charts.

Table 2 shows the relative building cost index figures from four authoritative sources:

TABLE 2.—BUILDING COST INDEX

Year	*Engineering News-Record*	*Engineering & Contracting*	Assoc. Gen. Contractors	F. W. Dodge
1913	100	100	100	
1914	89	100	98	
1915	93	98	98	100
1916	147	104	108	121
1917	181	119	128	128
1918	189	142	143	160
1919	198	174	171	192
1920	251	253	247	224
1921	202	205	200	235
1922	174	...	185	
1923	214	...	200	
1924	215	...	201	
1925	206	...	198	
1926	208	...	197	
1927	206	...	200	
1928	206			
1929	207			

The *Engineering News-Record* construction cost chart (Fig. 1) is developed on the basis of steel having a weight of influence of 37.5 per cent; cement, 7.14 per cent; lumber, 17.1 per cent; and common labor, 38 per cent. The cost of materials is for steel f. o. b. Pittsburgh; cement bags, f. o. b. Chicago; 3 by 12 to 12 by 12 in. southern pine, f. o. b. New York; and the average price of common labor in 20 cities in the United States.

It is obvious to the analyst that 37.5 per cent of the cost of building in any large city is not used for the purchase of steel;

that in many cities brick has a greater weight of influence in building costs than lumber; and that the percentage of 3 by 12 and 12 by 12 in. timbers used is very small compared to the total amount of lumber used for construction purposes.

The Dodge index was not published by the F. W. Dodge Corp. but was calculated by H. P. Gillette from data furnished by the F. W. Dodge Corp. Since 1915 the F. W. Dodge Corp. has published data giving total number of square feet in residence and industrial building construction and the total current price for contracts awarded. These data applied to cities having more than 3,000 population in 27 northeastern states, which include 70 per cent of the population of the United States.

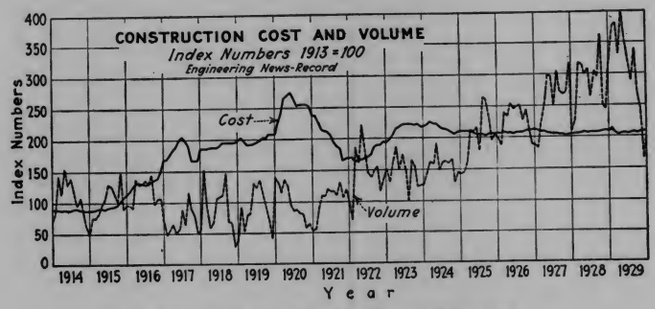

FIG. 1.—Engineering News-Record index chart.

The yearly index figure is arrived at by dividing the total contract price of building construction by the total number of square feet in the buildings.

The Associated General Contractor's index is based on the wholesale price index of lumber and building materials, the wholesale price index of metals as published by the Bureau of Labor Statistics, and on building wages in eight cities. Lumber and building materials are given a weight of 2 and metals a weight of 1. Then this figure is given a weight of 6 and wages a weight of 4 to arrive at the index.

The *Engineering and Contracting* index is arrived at by averaging the U. S. Bureau of Labor indexes for lumber and hourly wages of union labor.

The labor efficiency factor has been given but little consideration. Since 1913 the efficiency of building labor has varied

from 60 to 100 per cent. A decrease in labor efficiency increases the cost of building just as effectively as an increase in the cost

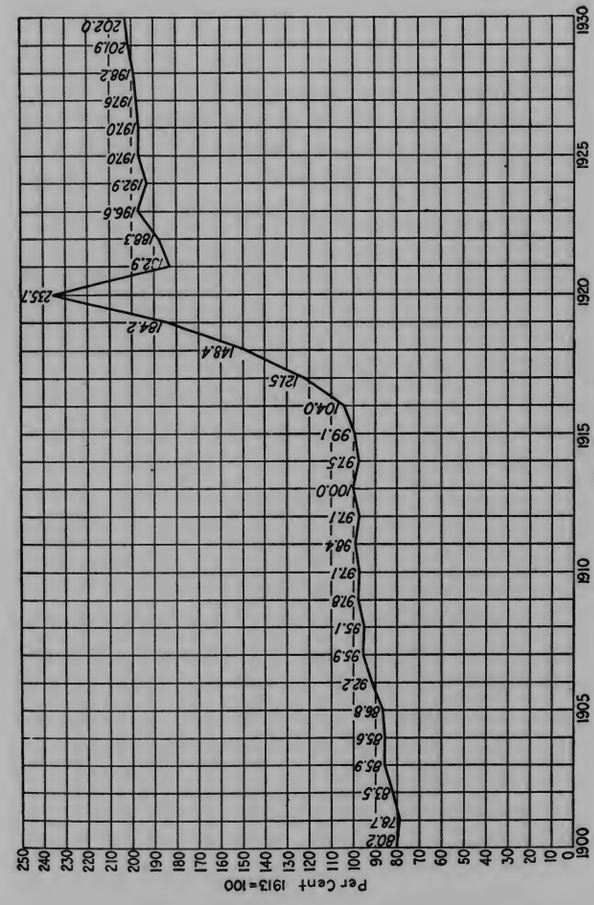

FIG. 2.—Denver building cost chart.

of building materials, and an increase in labor efficiency decreases the cost of a building just as effectively as the decrease in the cost of building materials. During the past few years the tend-

ency has been to approach the 1913 standard of 100 per cent in building labor efficiency.

Concerning the fourth point very few, if any, of the charts mentioned have taken into consideration every factor of material and labor which go into the construction of a building. This is an important matter.

The best results in any system of local valuation work are secured by making a local building construction cost index curve based upon actual local conditions and correctly showing variations in costs over a definite period of time. The Denver building cost chart is shown in Fig. 2.

Constructing the Local Cost Chart.—It will be necessary first to determine the percentages of the various kinds of material and labor which go into different types of buildings. This can be done by securing from local architects and contractors a complete detailed analysis of the cost of constructing every type of building. Table 3 gives the relationship of the component parts of a building relative to their percentages of the total cost.

TABLE 3.—ANALYSIS OF COST OF BUILDINGS, DENVER

Item	Percentage of total cost
Frame residence	
Lumber	19.3
Carpenter labor	17.9
Millwork	16.7
Brickwork and excavation	15.8
Plumbing and heating	9.0
Plaster	8.3
Painting	5.5
Hardware	3.5
Miscellaneous	3.0
Tin and galvanized iron	1.0
Total	100.0
Brick residence	
Excavation and brickwork	27.0
Millwork	19.0
Lumber	11.5
Carpenter labor	10.0
Plumbing and heating	10.0
Painting	7.0
Plaster	6.0
Miscellaneous	5.5
Hardware	3.0
Tin and galvanized iron	1.0
Total	100.0

TABLE 3.—ANALYSIS OF COSTS OF BUILDINGS, DENVER.—(*Continued*)

Item	Percentage of total cost
Steel skeleton	
Excavation, concrete work and brickwork	36.5
Structural steel	10.0
Lathing and plastering	4.0
Carpenter and millwork	8.5
Painting	1.3
Metal work	8.0
Plumbing and heating	10.0
Electrical work	2.5
Equipment	9.0
Miscellaneous	10.2
Total	100.0
Reinforced concrete	
Excavation and concrete work	43.0
Brickwork and tilework	1.4
Lathing and plastering	2.9
Carpenter and millwork	5.4
Painting	4.0
Metalwork	9.3
Miscellaneous	4.5
Plumbing and heating	14.7
Electrical work	4.3
Equipment	10.5
Total	100.0

Philadelphia Building Factors.—Barclay White,[1] Philadelphia contractor, arrived at a percentage of costs of the various factors of material and labor entering into an imaginary composite building in which he took actual cost figures of an ordinary two-story brick dwelling (row type), a detached residence, a reinforced concrete factory, a semi-fireproof constructed warehouse, a steel frame office building, a fireproof and wood floor school building with stone walls and a brick apartment house.

The figures for the composite whole were determined by reference to the volume of building permits where each type of building was given a weight of influence determined by its relative volume of construction. The result obtained represented as nearly as possible the exact relative importance of the various items of material and labor which constituted the total volume of building construction in Philadelphia. Table 4 shows the percentage of influence of each factor:

[1] *Eng. Contr.*, June 22, 1921.

TABLE 4.—COST FACTOR INFLUENCE

Item	Percentage of influence
Labor	
All skilled labor and supervision of building, including stonecutting and shopwork on sheet metal and millwork only	27.55
Unskilled labor, as above	9.44
Office estimating, general supervision and engineering salaries	5.60
Liability insurance	1.41
Total labor	44.00
Materials	
Lumber for millwork, concrete forms and structure, f. o. b. site	8.86
Brick, f. o. b. site	6.10
Steel structure, miscellaneous and reinforced concrete, f. o. b. site	5.93
Boilers, heating, piping, etc., for heating	3.05
Plumbing fixtures and piping	2.76
Cement, f. o. b. cars	2.60
Hardware, nails, etc	1.78
Sand, f. o. b. site	1.69
Electric fixtures, conduit, etc	1.60
Concrete aggregates	1.49
Sprinklers, fire-protection apparatus	1.04
Building stone	0.90
Paint	0.76
Roofing and sheet metal	0.70
Plastering materials, no sand	0.65
Lath	0.65
Steel sash, f. o. b. site	0.50
Lime, no plaster	0.40
Glass	0.40
Cut stone, terra cotta	0.38
Elevators, f. o. b. site	0.28
Mechanical equipment, cranes, etc	0.21
Tile and marble	0.10
Total material	42.88
Overhead expense and profit	
Office rent, taxes, interest, depreciation of equipment, general expense, overhead, not wages	5.80
Net compensation of all subcontractors, assumed as doing 65 per cent of work direct	3.90
Net compensation of general contractor, assumed as doing 35 per cent of work direct and supervising all work	3.42
Grand total	100.00

Government Reports on Distribution of Cost.—The U. S. Bureau of Standards, Division of Building and Housing, reported in 1922 that the percentage of labor cost in frame and brick houses was distributed as shown in Table 5:

TABLE 5.—BUILDING LABOR COST

Trade	Frame house, per cent	Brick house, per cent
Carpenters	49.6	32.2
Bricklayers	6.2	21.5
Hodcarriers	2.2	6.7
Plasterers	7.9	8.8
Plumbers	8.7	7.6
Electricians	2.6	2.5
Painters	10.0	6.3
Common labor	6.3	9.9
All others	6.5	4.5
Total	100.0	100.0

Variation in Labor Costs.—F. E. Barnes, building valuation engineer, has shown that, in 1890, 30 per cent of the cost of building was paid for labor, while at the present time 42 per cent of the cost of building is paid for labor.

Engineering News-Record Percentage of Building Cost Factors.—Table 6 gives the cost elements on five buildings actually constructed in 1926 and Table 7 gives a five-story loft building as reported by *Engineering News-Record.* Table 8 gives the cost factors for a five-story building as reported by Arthur.[1]

[1] "Appraisers and Adjusters Handbook."

TABLE 6.—COST ELEMENTS ON FIVE ACTUAL BUILDINGS

1. Office and exchange, steel frame (fireproof), limestone front and trim, 101 × 116; 23 stories and basement and two penthouses, 261,000 sq. ft., 3,738,000 cu. ft. (Geo. A. Fuller, New York).

2. Office and bank, steel frame (fireproof), limestone front and trim, 65.5 × 145.25; 12 stories and basement, 125,887 sq. ft., 1,569,512 cu. ft. (Geo. A. Fuller, New York).

3. Hotel, reinforced concrete (fireproof), face brick front, terra cotta trim, 172 × 200; 10 stories and penthouse, 234,631 sq. ft., 3,017,015 cu. ft. (Geo. A. Fuller, New York).

4. Factory, reinforced concrete; $461,711; Brooklyn. (Barney-Ahlers Construction Corp.)

5. Factory, reinforced concrete; $213,666; Long Island City, N. Y. (Barney-Ahlers Construction Corp.)

Figures are proportions of the total cost (labor and materials) of the building

Main operations	Included in main operations summary	1	2	3	4	5
General conditions	Permits, bond, insurance, association fee, damage, heat, plant	.0523	.0300	.0400	.0940	.0724
Masonry	Wrecking, excavation, blasting, shoring, waterproofing, pumping, brick stack	.0924	.1650	.1330	.0760	.1400
Caissons & piling	Concrete piles, creosoting wood piles, test borings	.0973	.0014			
Reinforced concrete	Drawings, royalty, reinf. steel, metal forms, inserts, test, reinf. con. stack	.0233	.0710	.1350	.2990	.0431
Cement work. & paving	Asphalt, mastic, brick, wood block & stone floors & pavements	.0100	.0160	.0340	.0298	.0070
Fireproofing	Tile arch, raised floor, book tile, partition tile, furring, col. covering, gypsum	.0412	.0270	.0402	.0245	.0685
Plastering & lathing	Furring, corner beads, cement base, stucco, solid & metal stud part., suspended ceiling	.0432	.0458	.0840	.0175	.0128
Terra cotta	Setting, anchors, scaffold, mortar, hoist, models	.....	.0057	.0170	.....	.0112
Cut stone	Setting, anchors, lewising, limestone, sandstone, marble models	.1400	.0790	.0041	.0427	.0053
Granite	Setting, anchors, lewising, monoliths, polishing, carving, models	.0070	.0039	.0020		
Mill & cabinet work	Frames and sash, trim, priming, cabinet finishing, revolving door, screens	.0170	.0218	.0560		
Carpentry	Rough hdwe. window cleaning dev., weather strips, caulk fr. flag poles	.0020	.0510	.0494	.0097	.0096
Roofing	Composition, slate, tile, guarantee	.....	.0047	.....	.0064	.0070
Metal windows	Underwriter hdwe., glass & glazing, set frames, store fronts	.0125	.0053	.....	.0064	
Sheet metal	Cornice, skylights, ventilators, flashing, tin fire doors	.0070	.....	.0109	.0267	.0106
Art metal doors	Metal jambs & trim, baked enamel finish, kalameined doors	.0250	.0196	.0050	.0422	.0053
Glass and glazing	Plate, prismatic sheet, art, wire, mirrors, corner bars	.0110	.0245	.0070		
Painting & decorating	Cold water paint, paper hanging, floor finish	.0160	.0059	.0185	.0267	.0154
Ornamental iron	Bronze, door hangers, door opening device, directory board	.0620	.0328	.0262	.....	.0047
Structural steel & iron	Details, inspection, sorting, setting, painting, stack, stack lining, c. i. bases	.0750	.1008			
Hardware	Kick plates, coat hooks, bead screws	.0060	.0071	.0167	.0104	.0059
Plumbing & sewerage	Permits, gas fitting, meters, filters, tanks & pumps, fixt's & accessories, fire equipment	.0410	.0620	.1947	.0491	.0448
Heating & ventilation	Boilers, temp. regulation, pipe covering, air washer, fans, ducts, h. p. piping	.0350	.0700	.....	.0468	.0663
Power plant	Boilers, stokers, eng., generators, switchboard, leads, breeching, coal & ash machinery	.....	.....	.0027		
Electric wiring	Telephone, telautograph, carriage call, clock system, burglar, fire & watchman alarm	.....	.....	.0186	.0299	.0163
Lighting fixtures	Gas, electric, combination, signs, lamps, glassware	.0160	.0270	.0159		
Elevators	Sidewalk lift, dumb waiter, signals, cabs, escalators, auto gates	.0720	.0647	.0159	.0674	.0078
Pneumatic service	Pneumatic tubes, compressed-air system	.0004	.....	.0070		
Vacuum cleaning system	Piping, power, receiver, sweepers	.0005	.....	.0008		
Sprinkler system	Tank, supply pipe, pumps, sprinkler heads, auto alarm	.0023	.....	.0050	.0462	
Refrigeration	Machines, pumps, tanks, insulation, refrigerators & doors	.0020	.....	.0144		
Miscellaneous iron	Lintels, bucks, wheel guards, curb angles, flag poles, safety treads	.0004	.....	.0030	.0257	.0225
Iron doors & shutters	Strap hinges, auto hdwe., meeker, peele drs., rolling shutters	.....	.....	.....	.....	.0065
Steel sash	Steel sash doors, setting, glass & glazing hdwe., sash operators	.0140	.....	.0001	.0099	.0261
Prismatic lights	C. I. frames, rein. concrete frame, floor lights	.....	.....	.....	.....	.0035
Fire escape	Permit, anchors, platforms	.0150	.....	.0016		
Package chute	Garbage chute, dust chute	.0024	.....	.0030		
Vaults & vault doors	Steel vault lining, vault fixtures, safes	.0003				
Marble	Slate, carrara glass, toilet hdwe.	.0310	.....	.0190		
Tile and mosaic	Ceramic, rookwood, grueby, rubber, cork tile and mats	.0100	.0510	.0079	.0124	.0016
Art marble & terrazzo	Scagliola, asbestolith gustavino	.0040	.....	.0020		
Furniture & fixtures	Window shades, carpets, bar, kitchen & laundry fixtures, incinerators	.0050	.....	.0085		
Mail chute	Floor thimbles, backboard, box, angles	.0010	.0013	.0009		

TABLE 7.—SCHEDULE OF COSTS, FIVE-STORY LOFT BUILDING[1]

Item	Contract amount	Extras	Percentage of total contract (extras not included)
General work			
Excavation and concrete foundation	$ 9,650	.....	6.6
Concrete	44,642	.....	30.6
Brick and tile partitions	2,000	.....	1.4
Lathing and plastering	4,164	.....	2.9
Millwork and carpentry	5,867	$ 606	4.0
Miscellaneous and ornamental iron	2,434	.....	1.7
Steel sash	4,522	.....	3.1
Metal doors	6,559	.....	4.5
Metal toilet partitions	725	.....	0.5
Painting and glazing	5,785	112	4.0
Roofing	2,061	.....	1.4
Marble work	418	.....	0.3
Finish hardware	950	.....	0.6
Metal office partitions	6,487	.....	4.4
Other expense	6,500	.....	4.5
	$102,764	$ 718	70.5
Plumbing, heating and ventilating			
Soil pipe	$ 2,150	$ 395	plumbing, 6.4
Sump pump	380	.....	
Water pipe	1,950	401	
Water heater	550	.....	
Plumbing fixtures	4,064	.....	
Gas fitting	260	47	
Boilers	1,800	.....	heating, 8.3
Steam piping	3,048	.....	
Valves and traps	650	35	
Radiators	2,953	.....	
Ventilating equipment	1,116	.....	
Heat regulation	2,603	.....	
	$ 21,524	$ 878	14.7
Electrical work			
Conduit and fittings	$ 2,717	$ 213	
Panels and cabinets	829	62	
Main service and panels	1,163		
Wire and fittings	1,012	22	
Hand-ball court wiring	310		
Other expense	273		
	$ 6,304	$ 297	4.3
Equipment			
Elevators and paper lifts	$ 11,836	.....	8.1
Lighting fixtures	2,084	.....	1.4
Venetian blinds	1,431	.....	1.0
	$ 15,351	.....	10.5
Total contract amounts	$145,943	$1,893	100.0
Extras	$ 1,893		
Total of building contracts	$147,836		
Architects' fee 5% of above	7,392		
Total of cost of building	$155,228		

Total contents, 486,610 cu. ft.; cost per cu. ft	$0.304
Cost per cu. ft. including architects' fee	$0.32
Extras 1.28% of total contract amounts.	
Cost of hand-ball court	
Contracts	$2,668
Architects' fee	233
	$2,901
Contents of hand-ball court, 10,450 cu. ft.; cost per cu. ft., $0.278.	

[1] *Eng. News-Record*, Dec. 8, 1927.

TABLE 8.—DETAIL COST, FIVE-STORY LOFT BUILDING[1]

Item	Cost	Per cent
Wrecking	$ 4,158	0.33
Excavating	47,990	3.79
Shoring	34,876	2.74
Steel work	156,563	12.33
Stone, cement and concrete	95,525	7.52
Fireproofing	38,865	3.07
Brickwork	56,222	4.44
Metal lathing	9,100	0.71
Plastering	39,560	3.11
Millwork	86,100	6.77
Carpenter work	117,000	9.22
Terra cotta	40,000	3.15
Heating	75,330	5.93
Elevators	106,200	8.36
Electric work	40,500	3.17
Sheet metal	21,840	1.72
Plumbing	51,520	4.06
Painting	20,335	1.60
Waterproofing	9,500	0.75
Ornamental iron	75,900	5.98
Tile and marble	90,000	7.09
Weather stripping	1,025	0.08
Vaults	24,750	1.94
Hardware	1,500	0.12
Vacuum systems	5,000	0.36
Mail chute	2,250	0.18
Revolving doors	5,700	0.45
Steel lockers	8,335	0.66
Refrigerating machinery	3,827	0.30
Roofing	950	0.07
Total	$1,270,421	100.00

[1] This information taken from "Appraisers' and Adjusters' Handbook," by William Arthur.

American Appraisal Co. Percentage of Building Cost Factors.—The American Appraisal Co. gives the percentages of a brick mill building as shown in Table 9:

TABLE 9.—DETAIL COST, BRICK MILL BUILDING

Item	Per cent
Materials	
Concrete materials	5.71
Lumber	15.12
Brick and mortar	8.30
Millwork	9.66
Cut stone	4.18
Coping	0.20
Cast iron caps and bases	1.56
Roofing	0.81
Galvanized iron	0.64
Paint	0.73
Total material	46.89
Labor	
Overhead	11.21
Profit	7.48
Engrs., archts. fees & superintendence	6.56
Compensation and insurance	1.33
Excavation	6.36
Concrete workers	3.28
Common labor	0.50
Bricklayers	4.43
Hodcarriers	2.23
Roofers	0.24
Painters	0.82
Carpenters	8.57
Sheet metal	0.08
Total labor	53.11

Arthur's Percentages of Building Cost Factors.—The following is taken from Arthur's "Appraisers' and Adjusters' Handbook," published by the Scientific Book Corp., New York City.

TABLE 10.—DETAIL COST OF BUILDINGS

Class of work	Stores & flats, per cent	22 frame bldgs., per cent	5 brick res., per cent	Warehouse, per cent
Excavation, brick and cut stone	32.4	15.8	36.6	50.0
Plaster	6.4	8.3	5.98	
Lumber	11.4	19.3	11.76	18.4
Millwork and glass	17.0	20.6	19.68	7.2
Carpenter labor	9.8	17.9	9.92	9.3
Hardware	2.5	3.5	3.1	2.4
Tin and galvanized iron	4.8	2.3	4.6	1.8
Plumbing and gas fitting	4.2	6.8	3.0	0.8
Painting	4.6	5.5	5.36	2.3
Iron and steel	5.4	.....	.....	5.9
Roofing, gravel	1.5	.....	.....	1.9
Total	100.0	100.0	100.00	100.0

Other Denver Percentages of Building Cost Factors.—Jay Williams, Denver building inspector, gives the following percentages for brick residences as shown in Table 11:

TABLE 11.—DETAIL COST OF RESIDENCES

Item	Per cent
Excavation	1.41
Foundation and walls	32.20
Floors	11.05
Roof	9.33
Partitions	12.73
Exterior doors and windows	7.95
Plumbing	6.13
Heating	8.00
Lighting	2.05
Miscellaneous	9.15
Total	100.00

The following table of percentages for four typical Denver residences is from information given by an architect and three contractors:

TABLE 12.—ANALYSIS OF COST OF RESIDENCES

Class of work	Actual cost			
	$20,000	$5,500	$5,200	$3,700
	Per cent	Per cent	Per cent	Per cent
Excavation, foundation & brick work	19½	28	27	29
Lumber and carpenters	37½	39	38	38
Painting	4	8	5	8
Plumbing	7	9	11	11
Plastering	5½	6½	7	9
Electric wiring	1½	4	2	4
Heating	7	3½	3	
Roof and tile baths	10	1		
Concrete work	3½		6	
Miscellaneous	3½			
Guttering and tinwork	1	1	1	1
Total	100	100	100	100

Los Angeles Percentages of Building Cost Factors.—In the Los Angeles revaluation the percentages of cost of the different elements of a brick apartment building, Class C, are as follows:

TABLE 13.—ANALYSIS OF COST, APARTMENT BUILDINGS

Item	Per cent
Foundation	11
Masonry	16
Steel	11
Lumber	20½
Ornamental iron	2½
Plaster	10
Partitions	2
Electric wiring	2
Painting	3
Plumbing	12
Heating	4
Marble and tile	5
Total	100

After determining locally the percentages of cost of labor and materials to be used in the valuation of every type of building, the next step will be to determine local cost index factors over as long a period of years as possible.

Local Cost of Building Materials and Labor.—In the Denver appraisal system costs of certain building materials and labor were secured from 1900 to 1930. In every instance the cost figure taken for any year was the average retail cost price for that year. The items given in Table 14 were selected because they are the most commonly used in building construction.

TABLE 14.—BUILDING MATERIAL AND LABOR UNITS

Item	Unit
Materials	
No. 1 Common lumber, 1″ × 4″	1,000 ft. b. m.
No. 1 " " 1″ × 12″	" " " "
No. 1 " " 2″ × 4″ (10′ to 16′)	" " " "
1″ × 3″ yellow pine grade B flooring	" " " "
1″ × 3″ clear maple flooring	" " " "
1″ × 3″ plain white oak flooring	" " " "
4″ & 6″ clear drop siding	" " " "
Extra "A" 6 to 2 shingles	1,000
No. 1 cedar lath	1,000
Wall board	100 sq. ft.
20-lb. building paper	Roll
1⅜″ windows, white pine	Each
Lime	Bushel
Cement	Barrel
Structural steel	Ton
Common brick	1,000
Face brick, red press	1,000
" " , wire cut	1,000
" " , white & speck	1,000
Labor	
Bricklayers	Hour
Carpenters	"
Painters	"
Plasterers	"
Lathers	"
Plumbers	"
Structural ironworkers	"
Laborers	"

The 1913 unit costs for the foregoing items were given a basis of 100, and the index figures determined from 1900 to 1930. These data should be secured for the greatest number of years possible.

From 1860 to 1900 the index of wholesale prices of certain materials, published by the U. S. Department of Labor, can be used as being applicable to conditions existing in any locality at that time.

In determining the yearly building material index, lumber was given a weighting of 65 per cent; brick a weighting of 33 per cent; and steel a weighting of 2 per cent.

The building material index was then determined by the following formula:

$$I_{bm} = \text{lumber index} \times 0.65 + \text{brick index} \times 0.33 + \text{steel index} \times 0.02.$$

The building cost index each year was calculated from the following formula:

$$I = I_{bm} \times 0.62 + I_l \times 0.38,$$

in which

I = building cost index.
I_{bm} = building material index.
I_l = building labor index.

The Denver building cost chart is shown in Fig. 2.

Since Jan. 1, 1925, there has been but little deviation in the building cost curve, and the probability is that there will be but slight deviation for a number of years to come. A new plane of reckoning has been reached and it seems only logical that future curves should be established with Jan. 1, 1925, as the base, equal to 100 per cent, which in turn may be compared with the 1913 base with a relative index of 200. In other words if the cost index based on Jan. 1, 1925 = 100 should be referred to the 1913 base at any time, it is simply a matter of adding 100 to the index figure.

In many cases the appraiser is not so much interested in making a comparison of present-day building costs with prewar conditions as he is in making a comparison with the costs over a period covering the past three or five years.

The appraiser at all times should keep in touch with the trend of local building costs, for both labor and materials.

Union Wage Scales.—Up to the present time all charts have been based on the union scale of wages, but in so-called "open-shop" cities the difference in wage scales between union and non-union labor is such as to affect appreciably the whole building cost curve. The National Association of Manufacturers made a study, in 1926, of the variations in cost of churches and schools erected under "closed-shop" and "open-shop" conditions. They found that for churches the cost of erection in open-shop cities was 81½ per cent of the cost in closed-shop cities and for schools 77½ per cent.

A recent study in Denver showed that 68 per cent of the building was done by non-union labor and 32 per cent by union labor. Considering all building construction to be controlled by union labor the index for the year 1927 would be 188.3; and if we give non-union labor its proportionate influence, we find that the building cost index for the year 1927 would be 177.6. Trade union membership in the United States reached the peak in 1920 with 4,078,740 enrolled. In 1924 the membership dropped to 2,900,000 and in 1927 it reached a total of 3,312,526.

The appraiser should keep in mind that every city has its own local conditions which will affect the building cost curves, and these conditions should be studied and their influence noted in arriving at cost index figures.

Relative Building Costs among Cities.—Table 15, compiled by Thomas S. Holden, vice president of the F. W. Dodge Corp., New York, shows the relative cost of buildings in 44 cities of the country on Mar. 1, 1927:

TABLE 15.—COMPARATIVE CONSTRUCTION COSTS

44 Cities, March, 1927. Index Numbers Based on New York as 100[1]

City	*A*, building costs	*B*, material prices	*C*, wage scales	*D*,* ratio *B/C* in cost index
1. New York	100	100	100	40/60
2. Pittsburgh	97	100	96	40/60
3. Cleveland	96	102	92	40/60
4. Dallas	93	104	85	40/60
5. St. Louis	92	86	96	40/60
6. New Haven	92	114	70	50/50
7. Chicago	89	86	90	40/60
8. St. Petersburg	88	100	79	45/55
9. Washington	87	89	86	40/60
10. Boston	87	92	84	40/60
11. Philadelphia	87	96	80	40/60
12. Rochester	87	96	79	45/55
13. Baltimore	86	88	85	40/60
14. Indianapolis	86	94	79	45/55
15. Salt Lake City	86	95	78	45/55
16. Cincinnati	85	92	80	40/60
17. Buffalo	85	97	76	45/55
18. Erie	85	103	71	45/55
19. Toledo	84	95	75	45/55
20. Detroit	84	95	75	45/55
21. Reading, Pa	84	100	68	50/50
22. Denver	83	85	81	40/60
23. Kansas City	83	85	81	40/60
24. Columbus	83	100	67	50/50
25. Houston	82	85	80	40/60
26. Grand Rapids	82	97	68	50/50
27. Portland, Maine	82	103	62	50/50
28. Des Moines	81	84	78	45/55
29. Louisville	81	86	76	45/55
30. San Francisco	81	89	74	45/55
31. Milwaukee	80	91	71	45/55
32. New Orleans	80	90	71	45/55
33. Seattle	79	83	76	45/55
34. Oklahoma	79	91	68	50/50
35. Memphis	78	88	68	50/50
36. Norfolk	78	95	62	50/50
37. Portland, Ore	78	74	80	40/60
38. Sioux City, Iowa	77	88	66	50/50
39. Los Angeles	77	91	64	50/50
40. Richmond	76	94	59	50/50
41. Minneapolis	75	85	65	50/50
42. St. Paul	75	85	65	50/50
43. Atlanta	74	93	55	50/50
44. Nashville	72	91	54	50/50

[1] Obviously, high wage scales have a larger weight in actual building costs than low wage scales. In the above table the ratio of prices to wages was taken as 40/60 where the wage scale index was 80 or over; 45/55 where the wage scale index was between 70 and 80; 50/50 where the wage scale index was 70 or under.

CHAPTER IV

ESTABLISHING A SYSTEM FOR BUILDING APPRAISALS

Building Appraisal Factors.—A modern system for the appraisal of buildings involves the following important factors:

1. Classification.
2. Physical life.
3. Physical depreciation.
4. Obsolescent depreciation.
5. Cost.
6. Records.
7. Field methods.
8. Office methods.

Each of the above factors will be considered in later chapters.

Need for Trained Assessors.—In Chap. II, the assessors' class was mentioned, and its purpose and program outlined. Unless every deputy assessor is educated and trained in the fundamental principles of building appraisal work, the system will be a failure, and the most effective way to secure satisfactory results is through the assessors' class. Many old-time assessors will be reluctant to abandon the freedom of the time-worn "guess" system, for the scientific principles laid down in modern assessing practice, where the "rule of fact" is the law and not the "rule of thumb."

The assessor must evolve the change from the "old" to the "new" courteously and tactfully in his dealings with his deputies as well as with the public. To do so will bring results which cannot help meeting the approval of friend and foe alike.

Installation of New System.—The change from the "old" to the "new" system should be made for the entire community at one time. To secure the necessary data and make the resultant computations will require considerable time, and to apply the results piecemeal to the community would defeat the purpose of equalization for which the revaluation is made.

Classification Factors.—The classification of buildings in any community for purposes of assessment requires thought and

study. In making a proper classification the following items must be considered:

1. Architectural definitions
2. Types of roofs.
3. Definitions of various types of buildings.
4. The least possible number of classifications.
5. A brief and yet complete description of every classification.
6. A clear definition of all extras.
7. Photographs of classified buildings.

Architectural Nomenclature.—It is essential that the appraiser know the meaning of architectural terms which are in general use among contractors and builders. The following list contains most of the definitions with which the appraiser should be familiar:

Alcove. A recessed room connected with a main or larger room.

Anchor. An iron bolt embedded in the foundation, by means of which the superstructure is held rigid to the foundation.

Angle Iron. A structural steel bar having an L-shaped section.

Apron. The inside wood trim of a window underneath the sill.

Arch. A convexly curved vertical span of steel, concrete, stone or wood.

Areaway. An open space within a building.

Asbestos. A non-burning mineral compound used for insulating and fire-resisting purposes.

Ashlar. Cut stone laid in regular or even courses.

Attic. That part of a building between the top floor ceiling and the roof.

Axis. A line about which an object may revolve or upon which an area is centered.

Balcony. A platform or seating arrangement projecting from the interior or exterior walls of a building.

Baluster. A small supporting column for a handrail.

Balustrade. A series of balusters together with a supported handrail.

Barge Board. A wide trim board placed on the ends of a gable roof.

Base Board. A board skirting the walls of a room at the floor line.

Basement. That part of a building below the first or ground floor which is better lighted and finished than a cellar.

Batten. A flat narrow strip of wood used for finishing and paneling purposes.

Batter. The vertically inclined slope of a wall or pier generally expressed as being so many inches horizontal to so many inches vertical.

Bay. Area between two roof trusses.

Bay Window. An arrangement of windows which project from the main wall of a building.

Beam. A structural member supported at both ends and designed to carry loads.

Beam Ceiling. A ceiling having projections representing beams.

Bearing Plate. A metal plate supporting structural members.

Bearing Wall. A wall which transfers roof and floor loads to the footing of a building.

Bed Plate. A metal plate supporting structural members.

Belt Course. A course of stone, brick or terra cotta projecting from the main wall of a building generally on the line of the sills.

Bevel. A surface cut at an angle greater or less than 90°.

Bond. 1. The joining of two or more structural members. 2. The method used in laying up brick.

Brace. A connection between structural members made to strengthen the structure.

Bracket. A projection from a wall designed to support loads.

Bridging. Small wood braces between structural members which give lateral strength and support.

Bulkhead. An enclosed platform beneath the show window of a store room used for display purposes.

Buttress. A projection built against a wall to resist lateral thrust of roof loads.

Caisson. A large and strong watertight box or casing in which work is conducted below water level.

Cabinet. An interior enclosed space containing shelves and drawers.

Canopy. A small exterior, ornamental roof projection over a door or window.

Casement. A sash with hinges on the side.

Casing. The wood or metal exterior or interior trim around door or window openings.

Cellar. An unfinished excavation under a building.

Celotex. A manufactured insulating lumber made of cane fiber, in flat sheets.

Ceiling. A grooved finishing lumber.

Column. A vertical structural member designed to carry loads.

Conduit. A pipe or a tunnel used to enclose electric wires, water pipes, steam pipes, etc.

Cooler. An arrangement of enclosed shelving through which outside air currents pass for cooling purposes.

Coping. The top capping or covering of a wall.

Cornice. An ornamental projection at the top of a wall.

Corridor. A wide gallery or passageway in a building.

Course. A horizontal continuous layer of brick, stone or terra cotta in a building.

Court. An interior open space surrounded on three or four sides by building walls.

Deadening. The application of insulating materials in a building to reduce the effect of transmitted sounds.

Dimension Shingles. Shingles made in uniform sizes.

Dome. A semi-spherical or inverted cup-shaped roof.

Dormer Window. A window placed in a small gable projecting from a sloping roof.

Dormitory. A building or large room used for sleeping quarters.

Double-acting Door. A door which swings both ways from a closed position.

Dowel. A small piece of steel used to bond one structural member to another.

Dumb Waiter. A small box elevator used for conveying materials from one floor to another.

Duntile. A patented clay building block.

Eave. That part of the roof projecting over the exterior walls.

Elevation. 1. An exterior vertical view of a structure. 2. The relative height above sea level.

Firewall. An interior wall constructed of fire-resisting material for the purpose of preventing the spread of fire.

Flashing. Metal strips placed around roof openings to provide water tightness.

Flat Roof. A roof having a slope just sufficient to provide for proper drainage.

Flight. The stairway between two landings.

Flue. A passageway for conveyance of smoke and gasses.

Flush. Having their faces in the same plane.

Footing. That part of the building which transmits the building loads to the earth.

Foundation. The walls of a building below the first or ground floor.

French Doors. A pair of doors having a number of small glass window lights.

Gable Roof. A roof of inverted V section.

Gallery. 1. A long passageway overlooking another part of the building or a court outside. 2. The seating part of an auditorium directly under the roof.

Gambrel Roof. A gable type roof with its slope broken, making two distinct pitches.

Girders. A structural member supported at both ends and designed to carry loads.

Grade. 1. The established finished ground line around a building. 2. The vertical rise in feet per 100 ft. horizontal measurement.

Grounds. Strips of wood embedded in the brick or concrete work for supporting the wood finish.

Grout. A mixture of cement and fine sand of a consistency that will easily pour, used for filling cavities in concrete work.

H Column. A structural steel member having an H cross-section.

Half Story. That portion of a house directly under the pitched roof having a finished floor and sidewalls at least 4 ft. high and finished ceilings is called a half story.

Handrail. The top of a balustrade.

Hatchway or Scuttle. A trap door through the ceiling used for entrance into the attic.

Header. 1. A joist cut between two other joists and perpendicular to them. 2. A brick with its end to the face of the wall in which it is laid.

Hip Roof. A roof having the same pitch on all four sides.

I Beams. A structural steel member having an I cross-section.

Incinerator. A device used for burning refuse.

Insulator. A poor conductor of heat, cold or electricity.

Joists. A beam supporting floor or ceiling loads.

Kellastone. An exterior stucco finish having a magnesite base and a crushed rock finish.

Landing. A floor at the top of a flight of stairs.

Laundry Chute. A chute connecting the upper floors with the basement and used for conveying laundry.

Lavatory. 1. A wash bowl. 2. A wash room complete with toilets.

Lean-to Roof. A sloping roof supported on one side by the wall of an adjacent building.

Ledge. A horizontal projection over the main wall of a building.

Light. A pane of glass in a window or door.

Lintel. A wood or metal beam which carries the wall load over a door or window opening.

Lobby. A public meeting place at the entrance to a theatre, office building or hotel.

Louvre. A slatted ventilator pitched to keep out rain and snow.

Mansard Roof. A roof having the same pitch on all four sides and a flat top.

Mantel. The facing about an open fireplace including the shelf.

Mezzanine. A low story between two floors of a building, especially between the first and second floors.

Millwork. All doors, windows, framing, trim, etc., used in a building.

Newel Post. The post at the top or bottom of a stairway supporting the handrail.

Nosing. That part of a stairway which projects out from the riser.

One Story. Any building having only one floor above grade level used for living or commercial purposes.

Parapet. A low wall along the edge of the roof.

Parquet. That part of the floor of a theatre immediately behind the orchestra pit.

Partition. A dividing wall between two rooms.

Party Wall. A common wall supporting floor and roof loads of two adjacent buildings.

Pebble Dash. A rough surface wall finish.

Pent Roof. A roof with a slope in one direction only.

Pew. A long continuous seat in a church auditorium.

Picture Mold. A molding placed on the walls of a room from which pictures may be hung.

Pier. A foundation for supporting heavy loads.

Pilaster. A narrow projection from the main wall of a building to help support truss and girder loads.

Pile. A structural member driven into the ground for the purpose of supporting loads.

Pin. A wood or metal connection between two structural members.

Pitch. The slope of a roof computed by dividing the center rise by the span.

Plan. A sectional view of a building taken in a horizontal plane.

Plate. A horizontal structural member used for supporting vertical structural members.

Plate Rail. A narrow shelf used for supporting dishes, etc.

Post. A vertical support for carrying loads.

Profile. Longitudinal rise and fall of ground surface shown in section.

Purlin. A small longitudinal beam resting on trusses and supporting the roof.

Rafter. A structural member supporting the roof.

Rail. The horizontal framework in a door frame.

Railing. The top member of a balustrade.

Ramp. An inclined runway from one floor to another.

Reinforced Concrete. Concrete with bars of steel embedded to take the tensile stresses.

Ribbon Board. A longitudinal brace on the inside of the rafters and studding.

Ridge. The top horizontal edge or peak of a roof.

Ridge Pole. The structural member forming the ridge.

Rise. 1. The vertical distance between the top of an exterior wall and the peak of a roof. 2. The distance from top of tread to top of tread on a stairway.

Riser. The vertical part of a stair.

Rubble Masonry. Masonry laid without respect to uniformity of courses and joints.

Sand Finish. A wall surface finished with fine sand.

Sash. The framework which holds the glass in a window or door. It may be glazed or unglazed.

Scratch Coat. The first coat of plastering applied to a wall.

Section. A view taken on a plane cutting a structure.

Sheetrock. A flat sheet having a gypsum base faced with paper.

Sheeting. Surface boards used as a base on floors, walls and roofs.

Siding. Finish lumber on exterior walls.

Sill. 1. Timbers resting on the ground or wood supports for supporting a superstructure. 2. The bottom part of a window or door frame.

Sleeper. A wooden wall support resting upon the building floor.

Skylight. A glassed opening in the roof.

Span. The horizontal distance between supports.

Specifications. A written description of the various parts of a building.

Sprinkler System. A pipe and nozzle installation which sprays water automatically in case of fire.

Steeple. A pointed vertical roof projection on a building.

Stile. The vertical member in a door or window frame.

Storm Sash. A light closed door outside the main entrance door to a building.

Stool. That part of the interior window frame which projects in from the window and rests on the apron.

Strap. A band iron connecting two pieces of wood and bolted to same.

Stucco. An exterior cement wall finish.

Studding. Vertical framework supporting walls and roof.

Subfloor. A floor laid on top of the floor joists underneath the finish floor.

Substructure. That part of the building below the top of the foundation.

Superstructure. That part of the building above the foundation.

T Iron. A steel structural member having a T section.

Terra Cotta. A molded and burned clay material used for facing and trim.

Tie. A connection between two or more structural members.

Tile. A molded and burned clay or cement material used for flooring, facing, walls and trim.

Tower. A tall structure extending upward from the main building.

Transom. A sash opening over a doorway.

FIG. 3.—English type residence.

Trap Door. A door set flush with the floor or ceiling.

Tread. The horizontal width of a step between risers in a stairway.

Trellis. An artistic arrangement of narrow strips of wood.

Trim. The finish of a room or building which varies in color or texture with the main part of the room or building.

Truss. A combination of structural members which carries loads and is supported at both ends.

Turret. A small tower projecting from the main walls of a building.

Two Story. Any building having only two floors above grade level used for living or commercial purposes with sidewalls two full stories in height.

Valley. The line of intersection of two roofs.

Vault. 1. An arched ceiling. 2. A strong enclosure.

Vestibule. A small hall at the entrance to a building.

Wainscot. The wooden facing on walls.

Wall Bed. A bed concealed in the wall when not in use.

Plate. A horizontal structural member used for supporting vertical structural members.

Plate Rail. A narrow shelf used for supporting dishes, etc.

Post. A vertical support for carrying loads.

Profile. Longitudinal rise and fall of ground surface shown in section.

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Sand Finish. A wall surface finished with fine sand.

Sash. The framework which holds the glass in a window or door. It may be glazed or unglazed.

Scratch Coat. The first coat of plastering applied to a wall.

Section. A view taken on a plane cutting a structure.

Sheetrock. A flat sheet having a gypsum base faced with paper.

Sheeting. Surface boards used as a base on floors, walls and roofs.

Siding. Finish lumber on exterior walls.

Sill. 1. Timbers resting on the ground or wood supports for supporting a superstructure. 2. The bottom part of a window or door frame.

Sleeper. A wooden wall support resting upon the building floor.

Skylight. A glassed opening in the roof.

Span. The horizontal distance between supports.

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Turret. A small tower projecting from the main walls of a building.

Two Story. Any building having only two floors above grade level used for living or commercial purposes with sidewalls two full stories in height.

Valley. The line of intersection of two roofs.

Vault. 1. An arched ceiling. 2. A strong enclosure.

Vestibule. A small hall at the entrance to a building.

Wainscot. The wooden facing on walls.

Wall Bed. A bed concealed in the wall when not in use.

FIG. 4.—Colonial type.

FIG. 5.—Spanish type.

FIG. 6.—Bungalow type.

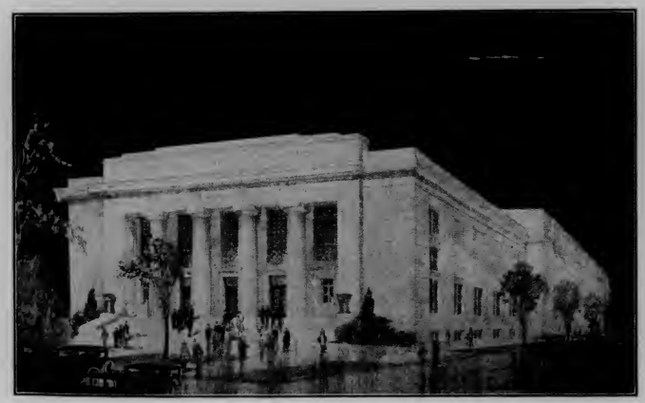


FIG. 7.—Classic type.

Wall Board. A manufactured fibrous material formed in sheets and used for facing walls and ceilings.

Wing. A building projecting out from the main building.

Types of Buildings.—Figures 3 to 7 shows the various types of buildings which are listed as follows:

1. English
2. Colonial.
3. Spanish.
4. Bungalow.
5. Classic.

Types of Roofs.—The different types of roofs with which the appraiser should be familiar are shown in Fig. 8.

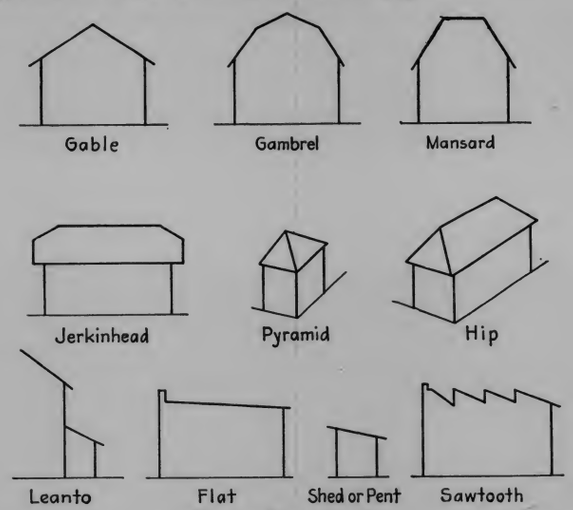


FIG. 8.—Types of roofs.

Definitions of Buildings.—The following definitions of different types of buildings will help the appraiser to become familiar with the building classifications.

1. Single Residence. A building designed for the use of one family.

2. Double Residence. A building designed for the use of two families living independently of each other and each family occupying all floors.

3. Two-family or Duplex Residence. A building designed for the use of two families; one using the first floor and one the second floor, with either separate or common entrances from the street.

4. Bungalow Apartments or Court. A building generally of U- or L-shape used for residential purposes where each family has separate, complete living quarters and a private entrance from the street.

5. Terrace. A building designed for the use of three or more families living independently of each other where each family occupies all floors.

6. Tenement or Flat. A building designed for the use of six or more families, two or more stories in height and divided like a terrace, where each family has separate and small apartments with a common entrance from the street.

7. Apartment House. A modern building designed for the use of three or more families arranged in suites independent of each other and having a common entrance from the street.

8. Apartment Hotel. A building designed for residential use being divided into small suites and having special service and other hotel accommodations such as public dining room, lounging room, etc.

9. Hotel. A building designed for the temporary living accommodation of the public, having individual sleeping rooms or suites and usually a public dining room.

10. Store Buildings. A building designed for one or more retail or wholesale business establishments, each occupying an independent space.

11. Department Store Building. A building designed for the retail sales of a variety of merchandise including dry goods.

12. Office Building. A building designed for the accommodation of stores on the ground floor and business offices on the upper floors.

13. Orphanage. A building designed to house orphaned children.

14. Hospital and Sanitarium. A building designed for the needs of the sick and disabled.

15. Bank Building. A building erected mainly for banking purposes.

16. Theater. A building designed for theatrical and motion picture purposes where more than 50 per cent of the cubage of the building is used for that purpose.

17. Church. A building erected for religious worship.

18. Public Buildings. A building constructed by governmental agencies or by individuals and dedicated to public use.

19. Fraternal Buildings. A building designed mainly for the use of lodges and other fraternal organizations.

20. Warehouse. A building used for the storage of merchandise or raw materials.

21. Factory. A building used for manufacturing purposes.

22. Loft Building. A building three or more stories in height where each floor has few or no partitions and is used largely for manufacturing or wholesale merchandising.

23. Public Garage. A building designed for the public storage or repair of automobiles or both.

24. Service Station. A building of small area designed to serve water, gasoline, oil, air and accessories to the automobile user and sometimes to make minor repairs.

25. Private Garage. A building designed for storage of automobiles for private use only.

26. Hot House or Green House. A building having glass roof and side walls and designed for the cultivation of flowers and vegetables.

27. Poultry House. A building designed to house poultry.

28. Barn or Shed. A building designed to house domestic animals, to store materials and for other sundry purposes.

NOTE.—Where a building is used for two or more purposes the greater use shall govern the classification.

Number of Classifications.—The smaller the number of classifications the easier and quicker it will be for the appraiser to allocate each building. Yet a sufficiently elaborate classification should be adopted to enable the appraiser to apply a definite unit price in arriving at the reproduction cost of a building. In the Cleveland system 53 classifications are used; in the Denver system 88; in the Los Angeles system 24; in the Cincinnati system 57; in the Duluth system 48; in the Portland, Ore., system 53; in the Minneapolis system 21; in the New York system 48; in the Milwaukee system 30; in the Rochester system 46; in the Jersey City system 39; and in the St. Paul system 96.

Building Classifications.—The five most important factors in every list of building classifications are:

1. A definite description of every classification, easily understood and quickly applied.
2. A subclassification into good, average or poor construction.
3. The cost per cubic foot for each classification.
4. The life in years for each classification.
5. The percentage of annual depreciation.

Experience has shown that a description of the following features in building classifications is important and advisable:

1. Number of stories.
2. The basement.
3. The basement floor.
4. The basement finish.
5. The foundation walls.
6. The superstructure walls.
7. The porches.
8. The type of roof.
9. Roof finish.
10. The upper floors.
11. Heating system.
12. Plumbing system.
13. Built-in features.
14. Fire-resisting qualities.
15. Extras.

Number of Stories.—The number of stories should be noted as 1, 1½, 2, 2½, 3, etc.

Basement.—The basement should be described as full, three-quarters, one-half, none, etc.

Basement Floor.—The basement floor should be described as wood, concrete, brick, etc.

Basement Finish.—The basement finish should be described as one room, plaster finish, no finish, etc.

Foundation Walls.—The foundation walls should be described as brick, concrete, stone, etc.

Superstructure Walls.—Outside walls should be described as brick, concrete, frame, stone, stucco, etc. Inside walls should be described as plaster, sheetrock, etc.

Porches.—The porches should be described as large, medium or small.

Roof.—The roof should be described as hip, flat, gable, gambrel, mansard, etc.

Roof Finish.—The roof finish should be described as wood shingle, composition shingle, concrete, tile, tar and gravel, etc.

Floors.—The floors should be described as hardwood, softwood, tile, cement, etc.

Heating System.—The heating system should be described as stove, hot air, hot water, steam, etc.

Plumbing System.—The plumbing system should be described as old style or modern, giving the kind of fixtures for which the following abbreviations can be used:

S. = kitchen sink.
L. = laundry tub.
B. = bath tub.
T. = toilet.
W. = wash bowl or lavatory.

Built-in Features.—The built-in features should be described as kitchen cabinets, china closets, fireplace, bookcases, colonnades, etc.

Fire Resisting.—In this work it is assumed that no building is fireproof in the strict sense of the word. Buildings may be defined as fire resisting, semi-fire resisting or non-fire resisting.

Extras.—All of the features of a building not included in the standard classification are considered as extras and must be added to the cost of a building. On the other hand, deductions should be made for certain features listed in the standard classification specifications which are not included in the building under consideration (see Chap. XVIII).

Kind of Construction.—When the type of building has been determined, the kind of construction automatically determines the cost per cubic foot. Construction is described as good,

average or poor. The difference in the cost between the good and average construction and between the average and poor construction varies from 2 to 5¢ per cu. ft. Methods of judging good, medium and poor construction are explained in Chap. V.

Cost per Cubic Foot.—This subject is discussed in detail in Chaps. IX to XVIII inclusive.

Life in Years.—The physical life of every type of building is discussed in Chap. V.

Percentage of Annual Physical Depreciation.—The percentage of annual physical depreciation is obtained by dividing 100 by the life in years of the building.

Descriptions of Classifications.—The fifteen factors given above constitute an ample description of every type of building and give in a clear and concise form the essential features of construction. It is often necessary, however, under the heading of "remarks" to make special mention of certain building features which will influence the cost of the building, or it may be necessary at times to state why deviations were made from the cubic-foot cost specified in the standard classification.

The appraiser should keep in mind the fact that his fieldwork is subject to review by other employees of the assessor's office and possibly by the assessor, the Board of Review and the property owner himself.

Exempt Property.—In some states the law requires the assessor to tabulate all exempt property and estimate the value thereof. The classification schedule, therefore, should include types of buildings subject to exemption. The following classes of property are generally exempt from taxation:

1. Charitable institutions.
2. Hospitals and sanitariums.
3. City, county, state, and federal buildings and grounds.
4. Fraternal buildings (not used for profit).
5. Churches.
6. Public and parochial schools.

Classification Schedules.—The schedules of classifications and costs given in Chaps. IX to XVIII inclusive are among the best in use by American cities today and may be used as a guide by the assessor for the arrangement of any local classification of buildings.

CHAPTER V

LIFE OF BUILDINGS

Factors Determining Life of Buildings.—The physical life of a building is dependent upon the following factors:

1. Location.
2. Type of building.
3. Kind of construction.
4. Character of construction.
5. Natural decay and disintegration.
6. Wear and tear.
7. Maintenance.

Location.—Buildings in different parts of the United States are exposed to the varying influences of the elements of nature. Heat, cold, water, wind and earthquakes must be considered in their respective domains of activity. Excessively hot and dry climates cause an excessive dry rot, warping of shingles and spalling of paint, conditions which are found in the southwestern part of the United States. Phoenix, Ariz., registered a temperature of 119° F. and Bismarck, N. D., a temperature of 45° F., which were the temperature extremes in the United States for the year 1927. The temperature on July 10, 1913, at Greenland ranch in Death Valley, Calif., was 134° F. The destructive action of freezing and subsequent thawing, which is common to the northern half of the United States, is well known to builders. The rot caused by underground and surface waters is one of the most serious factors in the life of some buildings. In many places the close proximity to the surface of the water table and the seepage of water from nearby water courses, prevent the construction of basements or cellars, seriously affect any foundation construction and often cause a settling which develops cracked walls and ceilings. Excessive surface water may result in a mold rot on interior joists and floors. Torrential rains often affect the life of a building by damaging the roof, and the resulting leaks cause even greater damage to interior plaster and

finish. Salt water is very destructive to plumbing installations and reduces the life of buildings. Salt precipitates deposited by seacoast fogs seriously affect the metal parts of buildings. Buildings in certain parts of the United States, particularly in the mid-western plains section and southern and eastern coast cities, are often subject to severe winds, tornadoes and hurricanes. The heavy stresses to which the buildings are subjected obviously lower their life expectancy.

Recently, as a result of such storms, earthquake zones have appeared in various parts of the United States where they have previously been unknown. In California where earthquake activity is well known, the matter has been a subject of intense scientific study. Earthquake zones have been mapped, their frequency and intensity calculated, and the architects and engineers, who build for the future, are designing their buildings to withstand earthquake shocks.

Thus far we have considered the life of buildings from a geographical standpoint. The location of a building, in some particular section of a community, may also greatly affect its life, the most detrimental factors being the result of manufacturing processes where waste, refuse, gases, smoke, fumes and other precipitates may seriously injure various types of structures.

Buildings constructed near chemical works are subject to the devastating effects of acid fumes which often destroy metal structures within a period of from 5 to 10 years. The smoke and waste gases from large manufacturing plants chemically affect most of the buildings within their radius of influence. Wood, brick and metal are chemically disintegrated, and the life of the buildings is thereby shortened.

In considering the many factors relative to the location of a building which have an influence upon its life, we find that no definite, fixed rule can be applied to all types of buildings. In the following chapters the physical life of buildings of every type is given, and these tables should receive careful study before adoption for use in any community. The assessor should secure all local data possible on the subject and apply the information in the determination of the correct life of buildings to meet local conditions.

Type of Building.—The life of buildings will vary with the type of construction, such as residences, stores, warehouses, office buildings, bank buildings, etc.

The cheapest type and consequently the shortest life for any type of building is found in residence construction. In California these structures are called the "maverick." They are constructed simply for shelter purposes, and their life will run from 15 to 25 years. The most expensive type of building, and those having the longest life, is government buildings. These together with the best constructed bank and office buildings have an estimated life of 150 to 200 years. Comparatively few buildings, however, which are subject to assessment will have a physical life exceeding 100 years.

A general classification which groups the types of buildings according to their years of physical life follows:

1. Residences, 15 to 120 years.
2. Factories, 20 to 55 years.
3. Public garages, 20 to 85 years.
4. Churches, 20 to 120 years.
5. Stores, 25 to 55 years.
6. Warehouses, 25 to 80 years.
7. Theatres, 30 to 55 years.
8. Apartments, 40 to 80 years.
9. Hotels, 40 to 100 years.
10. Orphanages, 40 to 80 years.
11. Hospitals and sanitariums, 40 to 80 years.
12. Fraternal buildings, 50 to 120 years.
13. Office buildings, 65 to 120 years.
14. Bank buildings, 65 to 150 years.
15. Public buildings, 80 to 200 years.

The life of buildings will also vary with the kind of construction, which may be classified as frame, brick, brick veneer, hollow tile, stone, concrete, cinder block, stucco, steel frame, brick bearing wall, etc.

Some of the oldest houses in the United States at the present time are made of white pine. It is generally acknowledged that, with favorable weather conditions, a well-built, well-maintained frame house will last as long as a brick house. It is a fact, however, that at least 90 per cent of the cheap construction is frame, and, consequently, we find that our building classifications will show a much less life expectancy for frame construction than for brick. The relative life of different types of construction is given in the following chapters.

Kind of Construction.—Perhaps the most important factor which enters into the fieldwork of the appraiser and which directly

affects the life of buildings is the determination of good, average or poor construction. To the inexperienced layman, the essential characteristics of the various features determining these classifications are not readily apparent. The following "earmarks" of good and poor construction may be helpful to the appraiser in his fieldwork:

Brickwork.—Good brickwork is always plumb and square, with all courses even and horizontal. Examination should be made of the "tightness" of the brickwork with exterior door and window openings and the joining of main walls with projections, such as bay windows, porches, etc. Poor brickwork will generally develop cracks at these joints. Settlement of porch floors, columns, piers and walls should be noted. Cracks in poor brickwork may be found at, or near, the corners of the building and above or below the exterior window and door openings. Poor brickwork is often due to poor mortar, and, where poor mortar has been used, disintegration will take place which is easily affected by water. Where water in excessive amounts has come into contact with brickwork, the mortar will be washed out, and as a result the bricks will be exposed. At or near the grade line, alkali and water action often cause the disintegration of poor brickwork. This in turn admits seepage of water into the basement, the effects of which are easily noticed on the interior basement walls, where the same disintegration process will take place. In poor brickwork, exposed corner bricks, such as porch piers and porch wall cappings, are very often loose and can be easily moved. Poor joints between the brickwork and floor joists characterize poor brickwork. Such joints permit drafts and in case of fire cause the floor supports to burn away.

Concrete Work.—Surface cracks, exposed rock and gravel aggregate, warped and spalled surfaces are general characteristics of poor concrete. The lack of expansion joints often causes serious cracks in the surface of concrete. Settlement in the foundation is often the cause of concrete failure. The lack of a proper quantity of cement will cause the early disintegration of concrete by water or wear. Poor concrete will often pull away from the brickwork or frame construction, leaving a gap through which the elements will enter and cause its failure. Concrete may be lifted, warped and cracked through the action of frost on the foundation. Rock pockets, seams left by forms and rough

irregular surfaces, all denote poor concrete work and can be readily seen by the appraiser.

Wood Framework.—As a general rule poor lumber and poor workmanship go together and good lumber and good workmanship go together. The exceptions, however, must be noted by the appraiser. Some of the characteristics of poor framework are the following:

1. Lack of proper and sufficient nailing of structural members.
2. Poor joining and fitting.
3. Walls, door frames and window frames not plumb.
4. Lack of bracing and bridging.
5. Too wide spacing of joists and rafters which will cause squeaky and sagging floors and sagging ceilings.
6. Lack of wind- and snow-load bracing for the roof.
7. Lack of tight joints at the eaves and all exterior and interior openings.
8. Improper spacing of posts and girders to carry floor loads.
9. Lack of provision for accepted standards of construction typical of each classified building, such as closets, scuttles, louvres, cabinets, etc.

Finish Woodwork.—Some of the "earmarks" of poor finish woodwork are:

1. Split and warped exterior siding.
2. Poor wall alignment.
3. Lack of exterior wood trim.
4. Poor joining at corners and around exterior and interior door and window frames.
5. Cheap, poorly designed and poorly built porches.
6. Cracks, shakes, knots and warping in floors.
7. Poor fitting windows and doors.
8. Cheap, poorly joined trim, such as baseboard, quarter round, casing, picture mold, chair rail, wainscot, etc.
9. Rough, unfinished surfaces.

Plastering.—Some of the characteristics of poor plastering are:

1. Cracks, especially in the ceiling and corners.
2. Exposed sand, hair, etc.
3. Lack of adhesion of plaster to lath.
4. Poor finish around joints and openings.
5. Lack of smooth uniform finish.

Painting.—Cheap paint and painting shows itself by cracking and peeling off, by fading colors and by the cheapness of its looks. Careless painting is most easily noticed around the trim and the cabinet work of the house.

Plumbing.—Plumbing is generally described as either "old style" or "modern." "Old style" plumbing consisted largely of enameled and plain cast-iron fixtures with lead-pipe connections and usually high flush tanks. "Modern" plumbing consists of vitreous-ware fixtures with galvanized iron, brass and nickel-plated piping. In all the larger cities plumbing installations are subject to rigid inspection by the City Building Department, and the serious results of poor and defective plumbing are thereby minimized.

Other Elements of Poor Design and Cheap Construction.—Narrow halls and stairways with insufficient headroom for easy clearance typify poor design and cheap construction. A lack of windows and doors precludes adequate light and ventilation. Insufficient closet room and storage space is not desirable. High narrow steps show lack of thought in designing. The convenience, or lack of convenience, in the location of built-in fixtures, plumbing fixtures, lights, flues, fireplaces, interior doors and stairways, etc., influences the proper classification of every building.

Many of the present-day apartment houses are old residences which have been remodeled, and which will seldom, if ever, prove as satisfactory and economical from an investment standpoint as newly constructed apartment houses. Both physical depreciation and obsolescence must be considered in arriving at a correct present value. Poor apartment house construction is chiefly characterized by the cheap materials with which they are constructed.

Poor construction in store buildings is emphasized by low ceilings, cheap floors which are not rigid, lack of window space and poor heating and lighting systems.

Cheap office building construction is characterized by wooden floor joists and wooden floors, poor arrangement of hall and office space, low ceilings, insufficient toilet and elevator facilities.

In factory, warehouse and public garage buildings, poor construction is generally noted by the lack of heating, lighting and toilet facilities, cheap wooden floors or no floors at all and an inexpensive roof supported by wooden rafters and wooden posts.

Character of Construction.—It is well for the appraiser to keep in mind the fact that every building, no matter how well it is built, develops some defects, and too much weight should not be

given to minor flaws which are not in any way characteristic of the construction of the building as a whole.

To use thoroughly seasoned or kiln-dried lumber throughout a building would be impractical and expensive, and, so long as green lumber, wet cement, wet plaster and wet paint are used in building construction, there will be subsequent shrinkage after the materials have become thoroughly dry. The appraiser must give a reasonable and proper weight of influence to all defects which come to his attention. Some are inevitable and unimportant, whereas others may denote serious structural defects.

The character of construction also reflects the efficiency of the labor and the skill of workmanship which have gone into the building. The negligence and carelessness or pride and skill of the craftsman can be easily seen by the experienced observer. The efficiency of building labor may be demonstrated in two ways, *viz.*, by the amount of work done per day and the quality of the work. Often the latter is sacrificed for the former. The highest efficiency is secured when the maximum amount of work and the best quality of work, which fully comply with the specifications governing the building, are produced. In the tables of physical depreciation which are given in the following chapters the buildings are considered to have an average normal amount of maintenance. Oftentimes, however, buildings are exceptionally well maintained, in which cases the appraiser must extend the estimated life of the buildings.

Natural Decay and Disintegration.—Even under the most favorable circumstances every building constructed is subject to the forces of nature which demand the fulfillment of that ancient prophecy, "From the dust it was created and unto dust it must return."

Wear and Tear.—The appraiser must keep in mind that the life of buildings given in the following chapters assumes an average normal maintenance. There will, no doubt, be many exceptions.

The wear and tear on a building varies directly with its intensive use. The average residence has five rooms, and the average number of persons to a dwelling is five. In 1920 there were 20,697,204 dwellings in the United States occupied by 24,351,676 families, or an average of 1.2 families per dwelling. In many of our largest cities there is a highly concentrated density of population, which is most striking in the tenement and foreign populated

centers. New York City has a density of population of 31 people per acre; Chicago, 25; Philadelphia, 25; San Francisco, 21; Atlanta, 12; Seattle, 10; Los Angeles, 5 (1927 U. S. Census).

Excessive wear and tear may reduce the life of a residence from 5 to 15 per cent. The same is true of other types of buildings. Constant wear and tear may denote that a business building is being used for its highest utility purpose, and a lack of it may signify that the factor of obsolescence has entered into the value of the building.

Maintenance.—Normal maintenance, upon which the life of standard classified buildings is based, may run from ½ to 5 per cent of the value of the building per year.

The Omaha Building Owners and Managers Association has published some interesting information. Actual figures show that receipts from rentals are disbursed as shown in Table 16.

TABLE 16.—OMAHA OFFICE BUILDING EXPENDITURES

Item	Per cent
Taxes	14.0
Cleaning	10.0
Heating	7.5
Decorating and alterations	7.5
Elevator service	5.0
Insurance	2.0
Lighting	2.0
Miscellaneous service	5.0
Depreciation and obsolescence	10.0
Interest on principal invested to net 5½ per cent	37.0
Total	100.0

The given figures for depreciation assume an economic life of 50 years for office buildings, or an annual depreciation of 2 per cent. On the basis of an original investment of $12 per square foot of rentable area (120 cu. ft. for each square foot of rentable area at 60¢ per cu. ft.) and 2 per cent for depreciation, the amount that must be set aside every year for each square foot of rentable area is 24¢. On the basis of $2.50 per sq. ft. for average rental, approximately 10¢ of each rent dollar will be required for a reserve to meet losses from depreciation and obsolescence.

The report states further that the land investment of the average office building is $5 per sq. ft. of rentable area. This makes a total of $17 per sq. ft. of rentable area for the original investment of land and building; 5½ per cent interest on $17 amounts to 93½¢ per sq. ft. In the average building having a rent charge of $2.50 per sq. ft. per year, 37¢ of each rent dollar is required to pay interest.

Excellent maintenance of a building adds a factor of appreciation which offsets depreciation to a certain extent and adds to the physical life of the building. Every building should be considered as a whole when applying a term of life and a percentage of depreciation, except when various parts of the building have been constructed at various times, in which case each must be considered separately.

CHAPTER VI

PHYSICAL DEPRECIATION OF BUILDINGS

Precision of Appraisal Work.—The valuation for assessment purposes does not require the refinement of the unit cost system for determining values, which is commonly used by accountants and engineers in their valuation work. Precision gained by the valuation of each individual construction item is often offset by the approximate estimate of the number of years of life for that item and its consequent amount of physical depreciation. The valuations obtained by a highly complicated unit cost system will be closely approximated by the valuations secured with the cubic foot cost methods when properly applied by experienced appraisers. The difference in resultant figures is usually negligible.

Expert Application of Cost Data.—The authors have had many occasions to check cubic foot cost figures against actual construction cost figures, and the results have been suprisingly close. An appraisal of a large apartment property in Denver was made for a Chicago financing company. A contractor, an architect and a deputy assessor were asked to submit valuation figures on the present value of the property. The contractor and the architect took the original plans and figured the present-day cost of the building on the unit cost basis, and the appraiser from the assessor's office applied the Denver cubic foot cost method devised by the authors. The three figures were submitted, and it was found that there was less than $10,000 difference between the highest and the lowest figure. The total estimated value was over $800,000.

The commercial need for unit cost appraisals is not questioned where the amount of time and money expended on the work is of secondary importance to the results obtained. In the valuation of buildings on a wholesale scale for purposes of assessment, the unit cost system cannot be considered and must give way to the more easily applied cubic foot cost system.

Methods Used for Physical Depreciation.—The methods most commonly used in figuring physical depreciation of building are:

1. The straight-line method.
2. The diminishing-value method.
3. The sum-of-years'-digits method.
4. The sinking-fund method.
5. The unit-cost method.

Straight-line Method.—The straight-line method allows an equal amount of annual physical depreciation over the entire period of life of the building. The value of the building, new, is divided by the number of years of estimated life to determine the annual depreciation. The percentage of annual depreciation is determined by the formula:

$$D = \frac{100}{L}.$$

in which

D = percentage of annual physical depreciation.
L = total physical life of building in years.

Example.—If a building having an estimated life of 50 years is now 20 years old, we have:

$$D = \frac{100}{50} = 2\% \text{ annual physical depreciation.}$$

$$20 \times 2\% = 40\% \text{ total present physical depreciation.}$$

If the present-day reproduction cost of this building was $10,000, the annual physical depreciation would be

$$\$10{,}000 \times 2\% = \$200.$$

The accrued depreciation to date would be

$$\$10{,}000 \times 40\% = \$4{,}000.$$

The present day value would be

$$\$10{,}000 - \$4{,}000 = \$6{,}000.$$

The straight-line method for figuring physical depreciation of buildings is simple, direct and satisfactory and is the most practical method for use by the assessor in his building valuation work.

It is true that the actual annual physical depreciation for any building is more during the first five years of its life than during the period following, but the percentage of difference for such variation from the straight-line formula for any year is so small as to be negligible. It varies also with every building classification. Although a high degree of maintenance may decrease the

actual physical depreciation at certain periods in the life of a building, it will be found that the straight-line method gives an average physical depreciation over the entire period of life. This method proves very satisfactory in assessment appraisal work.

Diminishing-value Method.—The diminishing-value method deducts a fixed and equal percentage each year from the previous year's value. The procedure is illustrated by the following example:

First Year:	
Cost of building	$10,000
Physical depreciation 2%	200
Value	$ 9,800
Second Year:	
Value of building	$ 9,800
Physical depreciation 2%	196
Value	$ 9,604
Third Year:	
Value of building	$ 9,604
Physical depreciation 2%	192
Value	$ 9,412

The chief difficulty of applying this method lies in the determination of the proper rate of annual depreciation. This rate is likely to be underestimated unless computed by the following formula:

$$r = 1 - \sqrt[n]{\frac{s}{c}}$$

In this formula:

r = rate of annual depreciation.
n = number of years of estimated life.
s = estimated residual or scrap value.
c = value of building new.

The advantages of this method apply more to an operating rather than an appraisal value. Clem W. Collins[1] has this to say about the diminishing value method:

> The expense of using a fixed asset consists of two elements, depreciation and repairs. Some accountants maintain that the sum of these two elements should be fairly uniform year by year; and, since repairs tend to increase, the depreciation should be charged off in a decreasing scale so that a large charge will be made for depreciation in the early years, when repair charges are light, and a small charge will be made for depreciation in the later years where more extensive repairs are necessary.

[1] "C. P. A. Review," John Wiley & Sons, Inc., 1928.

Sum-of-years'-digits Method.—The diminishing-value method is difficult to apply without an understanding of logarithms. Adminishing annual depreciation can be obtained by a more simple process through the use of the sum-of-years'-digits method. By this method the annual depreciation charges are computed by multiplying the total depreciation by a series of fractions the denominator of each of which is the sum of the years' digits and the numerators of which are the digits themselves taken in inverse order.

To illustrate, assume a factory building costs $32,500 and has an estimated life of 25 years. The years' digits are

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
Total 325

TABLE 17.—SUM-OF-YEARS'-DIGITS METHOD OF DEPRECIATION

Year	Fraction	Depreciation	Depreciated value
			$32,500
1	25/325	$2,500	30,000
2	24/325	2,400	27,600
3	23/325	2,300	25,300
4	22/325	2,200	23,100
and so on for each of the 25 years.			

Sinking-fund Method.—This method is used largely by accountants and provides that a certain fixed sum be set apart annually and allowed to accumulate at compound interest, so that at the end of the physical life of the building the sum will be ample to provide for a similar new building to replace the old one.

The formula for this method is:

$$d = \frac{C - (S \times P)}{D \div I}.$$

In this formula

d = amount of periodical depreciation.
D = compound discount on $1.
P = present value of $1.
I = simple interest rate.
C = value of building new.
S = estimated residual or scrap value.

Both the diminishing-value and the sinking-fund methods require considerable detail figuring without adding to the accuracy of the appraisal; consequently, they are little used in assessment valuation work.

Unit-cost Method.—In using this method each element of the building is valued and depreciated independent of the other elements; thus brick, tile, lumber, millwork, roof, floors, machinery equipment, etc., are all valued and depreciated separately. This entails a tremendous amount of work and is not suited to assessment appraisal where a large volume of work must be done in a short period of time with the least expense possible to secure consistently uniform and accurate results.

Charts Based on Straight-line Formula.—Figure 9 shows the percentage of annual physical depreciation to be applied each

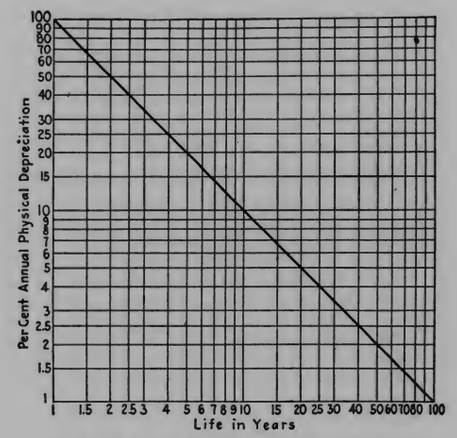


FIG. 9.—Per cent annual physical depreciation.

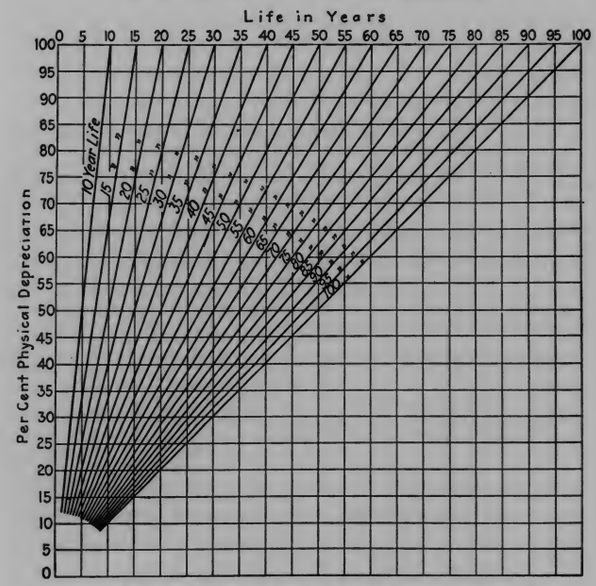


FIG. 10.—Per cent total physical depreciation.

year for a term of life from 1 to 100 years based on the straight-line formula.

Figure 10 shows the total percentage of physical depreciation to be applied to buildings at any year, for buildings having a total life from 10 to 100 years.

Maximum Depreciation.—In municipal appraisal work the assessor will often find that, if the maximum allowable physical depreciation be applied according to the rule, a building might become 100 per cent depreciated although still in use. This result, of course, would be incorrect. The continual, proper maintenance of the building over a long period of years has prolonged its physical life and permitted it still to be used. Save in exceptional cases no building still in use should be depreciated more than 80 per cent of its full value. The remaining 20 per cent will represent a minimum utility value.

It is often true that the ground on which an old building is constructed is more valuable than the building itself; but so long as the building is serving a useful purpose it has value, and where there is value, it is subject to taxation. It is conservative and reasonable to assume that the minimum taxable value of any building capable of service, or of producing income, should be 20 per cent of its reproduction value.

It may be a fact that such a building is not producing a gross income sufficient to meet all necessary expenses. This may be largely due to the increase in the value of the land imposing a tax burden which the obsolete and physically depreciated income-producing building cannot carry. The owner naturally decries high taxes, when the fact is the taxes are reasonable in proportion to existing values and the real trouble is caused by the land not being used for its highest utility purpose. The problem is often solved by clearing the ground of the present building and erecting a new building suited to capitalize on the increased value of the ground.

Fallacy of Capitalized Rentals.—Physical depreciation cannot be associated in any direct arithmetical manner with net or gross income, but income may indirectly reflect the degree of obsolescence. It is the duty of the appraiser to distinguish clearly between physical and obsolescent depreciation. Physical depreciation is the decrease in value because of age and use, and obsolescent depreciation is the decrease in functional value because of changing utility conditions. Physical depreciation

takes place within the building itself, independent of aesthetic, financial and utility considerations. Obsolescent depreciation takes place within the building itself as a result of community environment or lack of utility value and may be influenced by aesthetic, financial or utility factors.

If a property has become inadequately improved either through physical depreciation, obsolescence or appreciation of land values, there can be no significant relationship between value and income.

No constant, direct relationship can exist between income and value, where income is determined by such uncertain factors as the efficiency and personality of the owner or manager of the property, the percentage of vacancies, the methods of leasing and renting and the payment of fixed charges, such as taxes, water, telephone, light, heat, power, janitor service, etc.

Arbitrary vs. Scientific Depreciation.—In Rochester, N. Y., the practice is to allow no depreciation during the first ten years of the life of a building. This method is contrary to actual conditions and allows a certain unwarranted equality as to depreciation among all classes of buildings.

In New York City the practice is to allow a minimum assessment of an obsolete improved property equal to one year's rental. This would permit an assessment approaching 100 per cent total depreciation which seems too high.

The Detroit practice in establishing depreciation is summed up in the following statement:

> It is recognized by the Board that depreciation of a structure is a continuous physical fact. However, it is concluded by the Board that the amount of such depreciation in any one year cannot be definitely determined by any engineering or accounting formula and that such depreciation from year to year may not affect its utility or rental value or any other basis of its assessment, assuring, of course, ordinary maintenance. For this reason no set rule for depreciation has been evolved for general application by the Board, but the effect of this element is given consideration as deemed necessary by the Board in each individual instance.

The use of the system above described is in the category of "guess systems," from which the assessor is endeavoring to escape. Definite rules for physical depreciation are of tremendous value in scientific appraising. There are times when deviations must be made, and, when made, the reason for such

deviation from the rules should be noted on the real estate record card by the field appraiser.

On the real estate record card physical depreciation and obsolescence should be separated just as land and buildings are separated.

The life and the physical depreciation of buildings are considered more in detail in the following chapters. Table 18 gives the average physical depreciation of buildings as compiled by Prentice-Hall, Inc., of New York, from many sources.

TABLE 18.—BUILDING DEPRECIATION

Building	Annual physical depreciation, per cent
Academies with dormitories	3–4
" without dormitories	3½
Agricultural, brick	1–3
" frame	2–4
Amusement buildings	1
Apartment houses, fireproof	1½
" " non-fireproof	3 (5 yr.) 2½ (5 yr.) 2 for remainder of life (Zangerle)
Asylum, brick or stone	2½–3
" frame	3½–4
Auditorium	1
Bakery	3
Bank	2–2½
Barns, brick	3
" frame	4
Bath houses	1
Brick residences, occupied by owner	1–1¼
" " " " tenant	1¼–1½
Frame " " " owner	2–2½
" " " " tenant	2½–3
Churches, brick	1–2
" frame	3–4
Clubhouses	1
Corrugated iron	7½–10
" " siding	16⅔
Cotton mills	2–3½
Courthouses	2–5
Exhibition halls	1
Factories, all frame	5
" box and door	5
" candle, brick	3
" " frame	5
" canning, brick	2
" " frame	4
" cheese, brick	2½
" " frame	3½
" hat	1½–2½
" engineering	5–10
" starch, brick	3
" " frame	5

TABLE 18.—BUILDING DEPRECIATION.—(*Continued*)

Building	Annual physical depreciation, per cent
Filling stations, oil, ordinary wood or corrugated steel	20
" " brick & concrete	10
Fireproof, modern	2–4
Flour mill, brick or stone	2–2½
" " frame	3–3½
Garages	4
Gas plant	1⅓–3
Glass works, brick or frame	4
" " concrete	2½
Grain elevators	2½–4½
Hardware works, brick	3½
" " frame	4
Hat factory	2½
Horticultural	2
Hotel, brick & stone	2½–3½
" fireproof	1½
" frame	3½–4½
" non-fire resisting	3 (5 yr.) 2½ (5 yr.) 2 for remainder of life
Ice house brick	3
" " frame	4–10
Industrial, fire resisting	1⅓ (10 yr.) 1 for remainder of life
Institutions	2–2¼
Kilns, brick, tile or concrete	10
" frame	25
Knit goods mfg., reinf. concrete	2
" " " steel & brick, wood floors	2½
" " " brick wall, wood frame & floor	3
" " " wood frame	5
Lofts & factories	2⅔–3
Machine tool industry, brick	3
" " " frame	5
Mills, paint	7½
" paper	2½–3½
" planing	5
" rolling, brick	2½
" " frame	4

TABLE 18.—BUILDING DEPRECIATION.—(*Continued*)

Building	Annual physical depreciation, per cent
Mills, saw	7–10
" woolen	2–3½
Mine	2–20
Museums	1
Nail mill, brick	2½
" " frame	4
Nut or bolt mill, brick	3–3½
" " " " frame	4–4½
Office, face brick or stone	1–1⅓
" common brick	3⅓–5
" fireproof	1½ (6 yr.) 1 for remainder of life
" frame	6
Paper mills	2½–3½
Plants, absorption, gasoline	8–13⅓
" acetylene gas	10
" ash hauling	10
" asphalt paving	10
" blast furnace	6
" bleaching, dyeing, finishing	7½
" brass mfg	3
" brazing	15
" cement, portland, mfg	5–10
" chemical	3–10
" chlorination	5
" coal handling	10
" color, paint & varnish	5–7½
" cooling water	7½
" cutting & welding	12½
" disposal sewage	2½
" filtration masonry	2
" flat spinning	7½
" flour milling	5–7½
" galvanizing	12½
" gas, natural	20
" gasoline, natural gas	8–13⅓
" hotel	7½
" ice	5
" jam factory	5
" jewelry manufacturing	5
" lace, embroidery & muslin mfg	7½
" laundry	5–10

TABLE 18.—BUILDING DEPRECIATION.—(*Continued*)

Building	Annual physical depreciation, per cent
Plants, linen weaving	7½
" linoleum & floor cloth mfg	5–7½
" ore reduction	7½
" photo engraving	5
" printing	5–10
" pumping, mine	5–12½
" refrigeration	7
" sawmill	7
" silk mfg	7½
" steel mfg	15
" sulphuric acid	15
" welding & cutting	12½
" X-ray	7½
Porkhouses	2½–4
Post fence, ash	11
" " bur oak	6⅔
" " catalpa	6⅔
" " cherry	10
" " chestnut	6⅔
" " elm	11
" " hemlock	11
" " locust	4
" " mulberry	6
" " osage orange	3⅓
" " pine	9
" " red cedar	5
" " red oak	15
" " sassafras	11
" " steel	3⅓
" " stone	3
" " tamarack	10
" " walnut	9
" " white cedar	7
" " white oak	7
" " willow	16
" " concrete	2
Post office	4
Pottery, brick	3½
" frame	5
Power plant	2–5
" " brick & reinf. concrete	⅔
" " "	1
" " frame, heavy	1½

TABLE 18.—BUILDING DEPRECIATION.—(*Continued*)

Building	Annual physical depreciation, per cent
Power plant frame, light	2
" " electric light & railway	2–4
Prison	1
Quarry	2½
Railroad, frame	5
Refineries, oil located at point assuming long supply of crude oil	5
" oil located at point assuming supply for several years	10
" oil skimming plants and small refineries of poor construction or located at points where supply of crude oil is not assured for a long period of time	17
" sugar	7½
" " brick	2½
" " frame	4
Retort houses, gas	3⅓–10
Rolling mills, brick	2½
" " frame	4
Roofing, sheet metal	7
Roundhouses, railroad	3
Rubber factory	12½
Saltworks, frame	4
Schools	4
Schoolhouses	1
Sheds, coal	4–5
" dry	5
" poultry, portable	10
" railroad, frame	5
" ship	3⅓
" snow	4
Sheet iron	4–10
Shops, blacksmiths, stone or brick	5
" " frame	8
" machine	10–15
" " brick	3–5
" " frame	4–8
" railroad	2.3–3
" " 1 & 2 class	1⅓–2
Stables brick	3–5
" frame	4–10

TABLE 18.—BUILDING DEPRECIATION.—(*Continued*)

Building	Annual physical depreciation, per cent
Starch plant, brick	3
" " frame	5
Stations & waiting rooms, railroad	2–3
Steel & brick	2½
" " stucco	3
" construction	2–7
" frame, wood roof, corrugated iron walls	3½–7
frame, non-combustible roof and corrugated iron walls	3–6
" tile	2–3
Store, brick	1–5
" frame	1–6
" fireproof	1–1½
Storehouses, ice, frame	6½
Substation public utility	2–7
Tanneries, brick	2½–3
" frame	3½–4
Telephone & telegraph	2–3
Tenement, brick	3⅓–4
" frame	6⅔–10
Theatre	6
Tipples, coal mine, steel	4–10
" " " wooden	6⅔–8
Warehouse, brick	2–3
" " & steel	4–6
" mill type construction	4
" steel	3
" wood	3–8
Windmills	7½
Woolen mills, brick	2–2½
" " frame	3–3½
Works, brick making, brick	3½
" glass, brick	3–4
" " frame	4–4½
" hardware, brick	3½
" " frame	4
" nail, brick	2½
" " frame	4
" salt, frame	4

CHAPTER VII

OBSOLESCENCE AS APPLIED TO BUILDINGS

Obsolescence Given Little Scientific Study.—The rapid growth of American cities has made obsolescence one of the most indeterminate factors in appraisal work. During the past few years more study has been given to obsolescence than in the past decade, and certain fundamental principles underlying its causes and effects are becoming better known. No empirical formulas for the determination of the percentages of obsolescence have been evolved up to this time, and it is hoped that the formulas submitted in this chapter may be the means of bringing the subject from an intangible sphere of indefiniteness to the plane of scientific reasoning with logical conclusions.

Types of Obsolescence.—Obsolescence has already been defined as the decrease in functional value of a building caused by changing utility conditions and is due to one or both of the following factors:

1. *Internal obsolescence* or obsolescence resulting from the decrease in the ability of a building to serve the purpose for which it was constructed.

2. *External obsolescence* or obsolescence resulting from the change in the character of the surrounding district.

Internal Obsolescence.—*Internal obsolescence* may be due to one or more of the following conditions:

1. Poor or eccentric original design.
2. Change in type of construction.
3. Change in kind of construction.
4. Change in utility demand.

Poor Original Design.—A new building poorly designed may be immediately subject to obsolescent depreciation. Every type and classification of building has embodied within its specifications certain fixed elements of construction which standardize it and characterize it as being within that classification. To omit any important detail, considered absolutely essential in that type of construction, vitally affects the function which

the building was designed to serve and may establish an immediate and generally acknowledged factor of obsolescence.

The omission of plumbing in an otherwise strictly modern, new house; the installation of small windows in a new store front; the lack of a sufficient number either of stairways or elevators in a new multi-story hotel building; and the construction of thick bearing walls in the ground floor of a new office building or small glassed area in its upper offices would immediately establish a factor of obsolescence in those buildings.

Lack of fire escapes, improper and insufficient means of ingress and egress, lack of toilet, lighting, heating, ventilating and elevator facilities, exceptionally poor arrangement, size and height of rooms, partitions, halls and stairways and the lack of accepted standard modern conveniences—all detract from the value of a newly constructed building.

Eccentric Original Design.—More buildings are subject to obsolescence because of their eccentric original design than because of the poor execution of accepted architectural standards. Every large city has its own specific examples of wealthy citizens who have built to satisfy their personal whims and desires in constructing their "dream house," and who never gave a thought to the fact that it would be impossible for them to secure a return of the money invested through a sale of the property.

One of the most notable examples of eccentric, obsolete residences is the mansion of the late Senator William A. Clark, of Montana, which was built in 1905 at Seventy-seventh Street and Fifth Avenue, New York City, at a cost of $7,000,000. It was recently sold for $500,000. The Senator purchased marble and granite from quarries in Maine, Maryland and North Carolina to provide stone for his mansion. He purchased the Henry Bonnard bronze foundry and also woodworking mills in Long Island to use in preparing building materials. The place was a mass of sculpture of ornate beauty with bronze, gilt, marble and rare woods visible throughout. The ceilings were quartered oak overlaid with gold. Beautiful art galleries, swimming pools, a stage and one of the finest pipe organs in the country were a part of what realtors called "Clark's Folly." Now that the mansion has been sold, it has been found to be obsolete as a residence and will be torn down to make way for a modern building. Such is the vanity of man.

A reasonable policy to pursue from an assessment standpoint is to allow no obsolescence on eccentric buildings so long as they are used by the persons who conceived and built them. If, however, the owner disposes of such property and accepts a loss because of obsolescence, this loss should not be assessed against subsequent owners. The building then aquires a new status and a new basis of valuation.

Change in Type of Construction.—By type of construction we refer to residences, stores, warehouses, office buildings, etc. Changes in style over a period of years for each type of construction have taken place in the past and the style and kind of construction for each type of building identifies it as being constructed during a certain term of years. The cottage, the bungalow, the colonial, the English and the Spanish types of single residences were largely constructed during a specific period of years. The tenement, the apartment house, the brick bearing wall office building, the steel frame office building and the reinforced concrete office building can all be placed in certain year groups.

Obsolescence may take place very rapidly in specific instances, one of which is the case of an office building erected in one of our larger cities in 1916. At the time of its erection it was the last word in office building construction. Now that the owners are contemplating the erection of an additional office building on adjoining ground, of which the 1916 building would be a unit, they decided it would be economical to demolish the 1916 building as it was too obsolete to combine with the newer building. Exposed steel beams set in concrete in the ceilings and thick, cinder-insulated floors are the two factors which increased the height of the old building two feet and which present day construction would eliminate in the proposed new building by using a flat slab design. To build the new proposed addition two feet higher in order to meet these conditions would involve a tremendous additional expense, establishing the fact that it would be more economical to raze the present building before erecting the new and much larger one.

In 1926 the 11-story Woman's Temple building in Chicago was razed, and, during the process of demolition, Geo. Bailey and Earl Shultz of the National Association of Building Owners and Managers made a complete physical and income study of the building. Modern standards demand a different column spacing

for offices, and, in the case of the Woman's Temple building, they estimated that if the building had been constructed along modern lines with 17-in. walls instead of 5 ft. thickness in walls on the ground floor and 13 instead of 21-in. thickness in floors, the additional rental area provided would have produced $53,383 per year more income than at the time of demolition.

Without giving the matter much thought, the average person would think that office building construction has reached the zenith of perfection, but this is not true. Some of the important recent improvements the lack of which will make so-called "modern" office buildings obsolete are the following:

1. Removable steel partitions for creating large or small offices.
2. A standardized system of heating, lighting and plumbing which will easily permit the rearrangement of offices.
3. New methods of heating and ventilating will not require the opening of windows, which will be double glassed and permanently closed. This will largely exclude dust, dirt and noise.
4. New automatically controlled elevators with balanced controls for floor stops.
5. The set-back type of building which permits better light and ventilation.
6. New and improved lighting arrangements.
7. Enclosed interior fire escapes.

Change in Kind of Construction.—Kind of construction may be described as frame, brick, steel, concrete, etc. The materials of construction are constantly being improved upon. Most of the common brick of today are as good as the face brick used 20 years ago. Hardwood is replacing softwood for floors and finish. Bathroom floors are tile in place of wood; pipe conduits are used in place of open wiring; metal lath is replacing wood lath; concrete is replacing stone; terra cotta, travertine and other new materials are replacing brick on the fronts of large buildings; metal window and door frames are replacing wood; automatic electric elevators have taken the place of hydraulic elevators; electric vacuum cleaning systems supplant the old broom; insulated floors and ceilings are being adopted, steel battledeck floors are coming into use etc. This shows that obsolescence is a factor that is constantly operative. The rapidity with which we progress in this age makes the building that is the pride of the community today an antique and obsolete relic tomorrow. Certain kinds of construction which are now obsolete or are fast becoming so are listed below:

1. Stove heat.
2. Cast-iron plumbing fixtures with wiped-lead joints.
3. Undrained basement floors.
4. Kerosene, gas and gasoline lamps.
5. Apartments without automatic refrigeration.
6. Battery door bells.
7. Detached mail boxes.
8. Building without electric plug outlets.
9. Large dining room in certain types of residences.
10. Pantries.
11. Large kitchens in certain types of residences.
12. Alcoves.
13. High ceilings.
14. Unfinished floors.
15. Wood bathroom floors.
16. Sandstone fronts.
17. Brick bearing wall office buildings.
18. Hydraulic elevators.
19. Stone foundations.
20. No basement or small basement.
21. Bay or dormer windows.
22. Narrow and tall windows.
23. Mansard and gambrel roofs.
24. Large porches.
25. Porch scrollwork and balustrades.
26. Front fences.
27. Elaborate building front ornamentation.
28. Large metal cornices.
29. Ornamental barge boards.
30. Second-story balconies.
31. Towers and steeples on the roof.
32. Sliding doors between rooms, except fire doors.
33. Small cellar, poorly lighted and ventilated.
34. Fancy glass bedecked chandeliers.
35. Fancy interior balustrades.
36. Cellar trap doors.
37. Built-in china closets.
38. Wood front mantels.
39. Buildings without ceiling insulation.

Change in Utility Demand.—The utility of a building is the purpose for which it is designed. The utility of a residence is to provide living accommodations; the utility of a store building is to provide sales accommodations; the utility of an office building is to provide business quarters, etc.

The change in utility demand results from the development of greater human needs. More convenient and efficient quarters which cater to the cultural growth of living standards are required.

In many of the larger cities, at the present time, stately, well-built, large old residences are being converted into apartment houses. They have become obsolete as far as desirable single residences go. The demand for housing has developed a need for the concentration of human activities to such an extent that it has become profitable to convert these old, obsolete residences into apartment houses.

With reference to office buildings, the successful business man today demands neatly arranged and attractive offices affording not only mental contentment to himself but giving also an impression of success and refinement to those who call upon him in the daily course of business. The new office buildings with their beautiful lobbies, quick elevator service, tile and cork floors, plain pleasing finish, plenitude of light, heat, air and water appeal to the progressive business man and he vacates the old-style office to occupy the new. The office which he vacates is occupied by a business man who does not require or is not willing to pay for the refinement and the cultural setting demanded by his predecessor. He occupies the office at a reduced rental which denotes that the factor of obsolescence has set in and which increases from year to year until such time as the building becomes unprofitable from an investment standpoint. It is then torn down to make way for a modern structure. Obsolescence in factory buildings is brought about when new machines and processes are invented which cannot be properly housed in the old building. The development of safety appliances, better living and working conditions, better light, heat and ventilation may all bring about obsolescence in the factory building because of its unsuitability to meet the improved conditions.

External Obsolescence.—*External obsolescence*, or obsolescence resulting from the change in the character of the district surrounding a building, may result from one or more of the following factors:

1. Poor original location.
2. Change in the character of the district.
3. Specific detrimental influences.
4. Zoning laws.

Poor Original Location.—Many new buildings are obsolete at the time they are completed. This is the result of their location, which may have been selected without due regard to certain

fundamental principles of the relative economic relationship existing between building and land and between the improved property itself and the community in general.

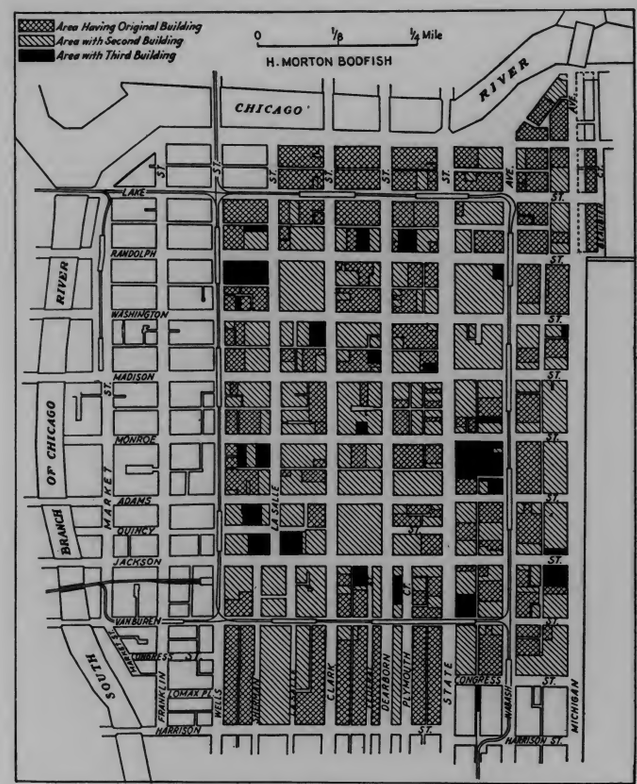


FIG. 11.—Chicago building replacements (1871–1926).

A large beautiful residence built in a factory district, an office building constructed outside the central business district, a large hotel built on the outskirts of a city may be examples of immediate obsolescence at the time of construction.

Change in Character of the District.—A study of the growth of American cities is interesting and fascinating. Every city has its own peculiar influences working for the inevitable development of certain districts at the expense of other districts. These influences may be geographical, aesthetic, financial, commercial, etc.

H. Morton Bodfish,[1] of the College of Commerce, Ohio State University, made a recent and interesting study of the physical changes in the loop district of Chicago which have taken place

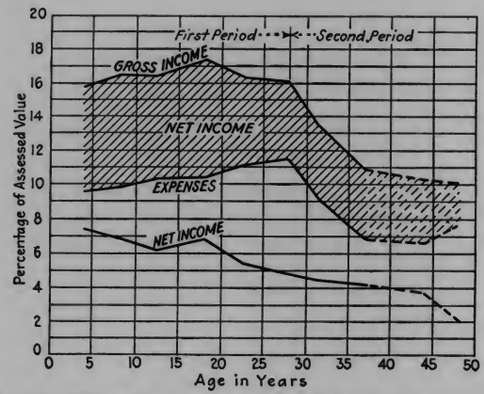


FIG. 12.—Effect of age of office building on income and expenses.

since the Chicago fire in 1871. Figure 11 shows the building replacements since that time:

Bodfish found that the buildings replaced in the entire area averaged a life of 26 years, which amounts to about one-third the possible physical life of the buildings. Table 19 gives data concerning large buildings which have been razed in the cities of New York and Chicago.

Effect of Obsolescence on Life of Office Buildings.—In a very interesting study of the effect of obsolescence on the useful and probable life of office buildings, Earle Shultz, vice president, National Association Building Owners and Managers, secured information on 55 office buildings in 45 different cities in the United States. Figure 12 shows that for a period of about 28

[1] *National Real Estate Journal*, Oct. 18, 1926.

TABLE 19.—LIFE OF OFFICE BUILDINGS

Building	Location	No. of stories	Year built	Year razed	Life, years
Mantock	Chicago	9	1883	1902	19
Rand McNally	"	10	1884	1912	28
Cont'l Bank	"	10	1884	1912	28
Royal Insurance	"	15	1885	1920	35
Mallers	"	12	1886	1920	34
Woman's Temple	"	11	1892	1926	34
Champlain	"	15	1895	1914	19
Trude	"	14	1897	1912	15
Illinois Trust	"	..	1898	1921	23
Western Union	New York	..	1875	1914	39
Washington	"	..	1885	1920	35
Wilks	"	..	1889	1920	31
Manhattan Trust	"	..	1894	1912	18
Manhattan Hotel	"	..	1895	1920	25
Average	.....	..	....	....	26.3

years, after the erection of a building, the gross income is nearly constant, with a gradual increase in expenses and a consequent

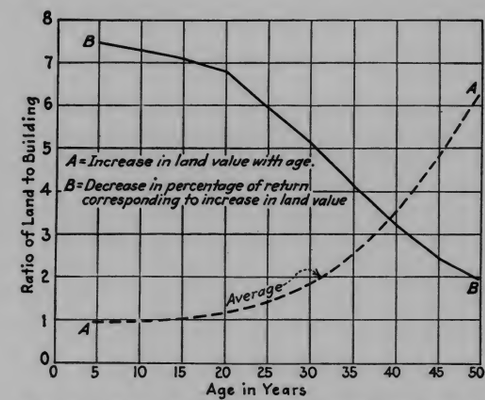


FIG. 13.—Effect of increase of office building land values.

decrease in net income. This period represents the useful and profitable life of an office building where it can house the best class of tenants and produce an adequate financial return on the

investment. After a period of 28 years, obsolescence sets in to such an extent that the highest class tenants move to more modern quarters. Subsequently, rents are reduced, maintenance expenses are increased and there is a continual reduction in the net income.

Lawson Purdy, former president of the New York City Tax Department, has stated that changes have been so rapid that frequently a building ceased to have any value before it had suffered any depreciation from age which was visible or ascertainable. Some buildings in Manhattan have become obsolete in five years and encumber the ground.

Ratio of Land Value and Building Values.—Shultz made a further study of the ratio of land to buildings, the results of which are shown in Fig. 13. The average building 5 years old has a value about equal to the value of the land on which it is constructed, and, at the age of 50 years, the land value is approximately six times that of the building. The percentage of net return of the building decreases from 7½ per cent at 5-year life to 2 per cent at 50-year life. Figuer 13 shows clearly that for the average office building values are constantly changing from the building to the land and, also the corresponding decrease in the percentage of return which the same amount of income will yield on the increasing value of the investment in building and land.

Factors of City Growth Affecting Obsolescence.—In considering the growth of cities we must consider first the general character of the city. Pittsburgh and Birmingham are industrial cities, New York is a financial center and Chicago is a commercial metropolis. Every city has developed a municipal character unlike that of any other city, and its character has definitely influenced the character of its architecture.

Topographical features, such as hills, ravines, mountains, lakes, oceans and rivers may permanently retard the growth of cities in certain directions. Irregular and poorly designed streets often develop stagnant business areas, and a lack of continuity in adjoining subdivisions is often a serious detriment to city growth. Unfortunately, many cities have no control over the laying out of new subdivisions within their boundaries. The plan of a city is the composite of the plans of the various subdivisions. A city which has been successful in securing well-designed subdivisions dovetailing into and complementing each

other in a satisfactory manner has taken one of the most important steps toward the ultimate realization of an efficient and comprehensive city plan. Once the land is laid out without consideration of the flow of traffic or the ultimate use of the land, irreparable damage has been done.

Progressive municipalities are adopting city plans which govern the growth and development of the community and its surrounding territory, and which take into consideration every factor influencing the growth of the city. Character changes in city growth are generally noted by changes of residence districts to business districts and from one kind of business district to another.

In Portland, Ore., the retail business center has shifted at the rate of one block in five years; in Denver one block in six years; in Seattle, one block in four years; in Omaha, one block in ten years; in Spokane, one block in four years.

The center of the retail shopping district (except New York City, where it is the center of the financial district) is responsible for the maximum density of pedestrian traffic. Here are found the highest rentals, the highest land values, and the highest utilization of land for income purposes. This requires the construction of the largest and most modern office and store buildings. Land and building values increase or decrease in the wake of the shifting retail business centers. In Denver the business, store, apartment house, factory and warehouse districts have all encroached upon the residence districts, and the expanding wholesale district has followed in the wake of the shifting retail district.

Specific Detrimental Influences.—The obsolescence of many buildings is due to external, specific and detrimental influences among which may be listed the following:

1. Smelters.
2. Stockyards.
3. Factories.
4. Traffic location and noises.
5. Proximity to public buildings.

The smoke and fumes from smelters, the obnoxious odors from stockyards and the noises of factories are objectionable to a community and detract from the value of the real estate. Traffic noises and the location of traffic arteries may be detrimental to

certain classes of property. Railroad rights-of-way often cause dead-end streets which injure adjacent property. In Spokane, Wash., the construction of a railroad across the main street actually turned the trend of growth in the business district from one street to another street running at right angles and caused serious obsolescence in a number of buildings.

The construction of churches, auditoriums, courthouses, city halls and other public buildings is sometimes considered a benefit to the surrounding property. The benefit is questionable in many cases where these buildings form "dead" areas which are decidedly detrimental to other business and commercial types of buildings.

Traffic is the life blood of a city's business, and, where the important thoroughfares are changed from one location to another, the adjacent property is very likely to suffer through loss of traffic. One of the greatest problems of city planners today is to instill life into dead areas by means of street extensions and widening which will permit traffic to circulate to the advantage of the entire area. Huge sums of money are being spent by American municipalities to make ample provision for traffic requirements.

Zoning and Obsolescence.—One of the latest and most helpful developments in the growth of American cities is the enactment of zoning ordinances for the regulation of the use of land, the height of buildings which may be constructed thereon and the area required for each type of building. Almost 600 cities having a total population of over 31,000,000 now have zoning ordinances. To the appraiser a zoning ordinance may be especially significant because it establishes zones of obsolescence, in that all buildings within a zone which are not used for purposes prescribed for that zone may be affected by obsolescence.

Zones are generally classified as residence, business, commercial and industrial. In the Denver system the use of zoning maps, which established the use to which all land within the city could be put, was very helpful in determining the percentage of obsolescence which should be applied in specific cases of buildings having a non-conforming use.

The Denver "use district" regulations are given herewith to show the grouping of buildings which helps to establish factors of obsolescence.

ARTICLE II

USE DISTRICT REGULATIONS

Sec. 3. Residence District Uses.

a. Residence A District.—In a residence A district no building or premises shall be used, and no building should be erected which is arranged, intended or designed to be used for other than one or more of the following uses:

1. Single family dwelling. Two-family dwelling. Multiple dwelling.
2. Church. School. College. Public library. Public museum. Community building.
3. Public park. Public playground. Public recreation building. School or college stadium or athletic field. Golf course. Polo field. Water supply reservoir, well, tower, or filter bed.
4. Railway right-of-way, not including railway yards. Passenger station.
5. Farming. Nursery. Truck gardening. Non-commercial conservatory for plants and flowers.
6. Private garage as provided in Sec. 10.
7. Private club, excepting a club the chief activity of which is a service customarily carried on as a business.
8. Philanthropic institutions other than a penal or correctional institution. Hospital or sanitarium other than for contagious or infectious diseases and other than for the insane or feeble minded.
9. Telephone exchange where no public business office and no repair or storage facilities are maintained.

b. Residence B, C and D District.—In a residence B, residence C or residence D district no building or premises shall be used, and no building shall be erected or structurally altered which is arranged, intended or designed to be used for other than one or more of the following uses:

1. A use permitted in a residence A district.
2. Hotel. Dormitory. Sorority or fraternity house. Boarding or rooming house.

c. Residence E District.—In a residence E district no building or premises shall be used, and no building shall be erected or structurally altered which is arranged, intended or designed to be used for other than one or more of the following uses:

1. A use permitted in a residence A, residence B, residence C or residence D district.
2. Office. Studio.

Sec. 4. Business District Uses.—In a business A, business B or business C district no building or premises shall be used, and no building shall be erected which is arranged, intended or designed to be used for other than one or more of the following uses:

1. A use permitted in a residence district.
2. Commercial greenhouse. Bank. Fire station. Ice delivery station.

3. Commercial billboard or advertising sign.
4. Store or retail trade. Shop for custom work. Shop for the making of articles to be sold at retail on the premises. Restaurant. Theater. Moving picture house. Assembly hall. Mortuary. Any use not provided for as a permitted use in any other district, provided such use is not noxious or offensive by reason of the emission of dust, odor, smoke, gas, fumes, noise or vibration.
5. Electric substation.
6. Garage or filling station as provided in Sec. 9.

Sec. 5. Commercial District Uses.—In a commercial A, commercial B or commercial C district no building or premises shall be used, and no building shall be erected or structurally altered which is arranged, intended or designed to be used for other than one or more of the following uses:

1. A use permitted in a residence district or a business district.
2. Lodging houses. Wholesale business.
3. Storage in bulk of, or warehouse for, such material as building material, contractor's equipment, clothing, cotton, drugs, dry goods, feed, fertilizer, food, fuel, furniture, hardware, ice, machinery, metals, oil and petroleum in quantities less than tank car lots, paint and paint materials, pipe, rubber, shop supplies, tobacco or wool.
4. Cold-storage plant. Ice manufacture. Creamery. Ice-cream manufacture. Bottling works. Milk bottling or central distributing station. Baking plant.
5. Dyeing or dry cleaning plant. Laundry where mechanical power is used.
6. Motor vehicle repair shop. Automobile paint shop. Battery repair shop. Tire repair or vulcanizing shop.
7. Stable or wagon shed for more than five horses or wagons. Veterinary hospital. Blacksmith or horse-shoeing shop.
8. Street-car barn. Street-car repair shop. Freight terminal. Grain elevator. Railroad yards. Lumber yard. Coal, coke or wood yard.
9. Penal or correctional institution. Hospital or sanitarium for contagious or infectious diseases or for the insane or feeble minded.
10. Printing plant. Monument works.
11. Aviation field. Amusement park. Fair grounds. Circus grounds. Crematory. Cemetery.
12. Storage of live poultry or poultry killing or dressing for sale at retail on the premises.
13. Manufacture or industrial operation of any kind not heretofore listed and exclusive of the industrial operations listed as industrial district uses in Sec. 6, where not in excess of 5 hp. is employed in the operation of any machine. Provided, that no industrial process shall be included which emits dust, odor, gas, fumes, noise or vibration comparable in character or in aggregate amount to that of any use listed as an industrial district use.

Sec. 6. Industrial District Uses.

a. Industrial A District.—In an industrial A district no building or premises shall be used, and no building shall be erected or structurally altered

which is arranged, intended or designed to be used for other than one or more of the following uses:

1. A use permitted in a residence district, a business district or a commercial district.
2. Scrap iron or junk storage. Automobile wrecking yard. Scrap paper or rag storage, sorting or baling. Foundry. Stone quarry. Rock crusher. Stonecutting.
3. Brick, tile or terra cotta manufacture. Sand or gravel pit.
4. Bag cleaning. Carpet cleaning.
5. Dog pound.
6. Acetylene gas manufacture. Oxygen manufacture.
7. Brewing or distilling of beverages.
8. Celluloid manufacture.
9. Paper manufacture. Plaster manufacture.
10. Dextrine, glucose or starch manufacture.
11. Disinfectant or insecticide manufacture.
12. Ammonia, bleaching powder or other chemical plants emitting corrosive or toxic fumes carrying beyond the limits of the premises, other than uses listed in subdivision B of this section as industrial B district uses. Asphalt manufacture or refining. Coal distillation including manufacture or derivation of by-products. Coke ovens. Creosote manufacture or treatment. Gas manufacture from coal or petroleum or the storage thereof. Carbon or lampblack manufacture. Petroleum storage in quantities greater than tank car lots. Tar distillation.
13. Central station, light or power plant.
14. Boiler making. Locomotive manufacture. Railway car manufacture. Railroad roundhouse or shop. Reducing or refining aluminum, copper, tin or zinc. Steel furnace, blooming or rolling mill. Power forge. Structural iron or pipe works.
15. Linoleum or oilcloth manufacture.
16. Chicken slaughter house. Pickle, sauerkraut or vinegar manufacture. Soap manufacture.
17. Raw hides or skins, curing or tanning. Wool scouring.
18. Grain drying or poultry-feed manufacture from refuse mash or refuse grain. Flour or feed mill.
19. Sewage disposal or treatment plant. Garbage disposal plant. Refuse dump.
20. Small arms ammunition or fireworks manufacture.
21. Manufacture or industrial operation of any kind not heretofore listed and exclusive of the industrial operations listed as industrial B district uses in subdivision *b* of this section. Provided, that no industrial process shall be included which emits dust, odor, gas, fumes, noise or vibration comparable in character or in aggregate amount to that of any use listed as an industrial B district use.

b. Industrial B District.—In an industrial B district no building or premises shall be used, and no building shall be erected or structurally altered

which is arranged, intended or designed to be used for other than one or more of the following uses:

1. A use permitted in a residence district, a business district, a commercial district or an industrial A district.
2. Petroleum or kerosene refining or distillation or the derivation of by-products.
3. Cement, lime, gypsum or plaster of Paris manufacture.
4. Chlorine or hydrochloric, nitric, picric or sulphuric acid manufacture. Smelting of copper, tin, zinc, lead or iron ores.
5. Manufacture of explosives. Storage of explosives in bulk.
6. Abattoir. Meat packing. Distillation of bones. Fat rendering in manufacture of tallow, grease or oils. Fertilizer manufacture. Hair manufacture. Offal or dead animal reduction. Stockyards.
7. Glue, size or gelatine manufacture where the process includes the refining or recovery of products from fish, animal refuse or offal.
8. Any industrial process emitting dust, odor, gas, fumes, noise or vibration comparable in character or in aggregate amount to that of any use specified in paragraphs 2 to 7 inclusive of this subdivision.

As a general rule the percentage of obsolescence due to zoning will vary directly as the use of the building differs from the zoned use for the district and also as the percentage of buildings in the district conforms to the use prescribed by zoning. The following table has been prepared as a result of expert opinion expressed by zoning authorities showing the effect of zoning on external obsolescence of buildings.

TABLE 20.—PERCENTAGE OF EXTERNAL OBSOLESCENCE DUE TO ZONING

Type of building	Zoned use of district and per cent conformity											
	Industrial			Commercial			Business			Residence		
	50–90 %	25–50 %	10–25 %	50–90 %	25–50 %	10–25 %	50–90 %	25–50 %	10–25 %	50–90 %	25–50 %	10–25 %
Residence	25	15	10	50	25	10	40	25	10	0	0	0
Business	20	10	5	15	10	5	0	0	0	0	0	0
Commercial	10	5	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0

Obsolescence Formulas.—Any formulas deduced for obsolescence are largely dependent upon human opinion, and therefore cannot be considered mathematically exact. They may be used as a guide, however, in helping to determine the factor of obsolescence in a building.

The amount of obsolescence in any building is the difference between the present day reproduction value less physical depreciation dependent upon the present life of the building in years, and the actual present market or income value of the building, or:

$$Ob = (R - P) - Mb.$$

In which

Ob = obsolescence.
R = present-day cost of reproduction.
P = physical depreciation dependent upon the life of the building, in years.
Mb = present market or income value of building.

R and P can be figured with mathematical exactness and the determination of the value Ob will, therefore, be dependent upon the determination of the value Mb.

When an obsolete property has been sold under normal conditions, the amount of obsolescence may be determined by subtracting the physical depreciation and the sale price from the reproduction cost.

The value of Mb is the fair, present cash value of the building and may be tested by:

1. Capitalizing income.
2. Sale of similar properties located near by.
3. The utility test.

Capitalization of Income.—Capitalization of income should never be used as the sole means of determining the value of property. It may be used, however, as a test in determining obsolescence where there is no doubt about obsolescence having taken place. The most significant result of obsolescence is the decrease in gross income; therefore we will consider gross income as a measure of obsolescent depreciation.

The capitalization of income is the result of dividing the income by a given rate, representing a fair rental return:

$$Mb + Ml = \frac{I}{C},$$

and

$$Mb = \frac{I}{C} - Ml.$$

where

C = capitalization factor.
I = gross yearly income from property.
Mb = present market value of building.
Ml = present market value of land.

Generally accepted values for C are as follows:

TABLE 21.—VALUE OF C

Type of building	C
Residences, single, double, duplex and two family	0.10 to 0.15
Terraces, flats, tenements, stores	0.12 to 0.15
Office bldgs., cheap hotels, cheap apartments	0.15 to 0.20
First-class apartments hotels, lofts, office bldgs	0.12 to 0.20

Ml may be determined by methods described in Chap. XXII.

For example, let us assume that the present-day reproduction cost of a store building is $25,000 and the building which is 15 years old has an estimated life of 50 years giving a 2 per cent annual physical depreciation. Obsolescence has taken place and the gross yearly income is only $1,500. The present ground value is $5,000; therefore,

$$Mb = \frac{1,500}{0.12} - \$5,000 = \$7,500,$$

which is a test figure of the present value of the building, and, we have,

$$Ob = (R - P) - Mb.$$
$$Ob = (\$25,000 - \$7,500) - \$7,500.$$
$$Ob = \$10,000.$$

The present percentage of obsolescence is

$$\frac{\$10,000}{\$25,000} = 40\%$$

The physical depreciation is 30 per cent and the total depreciation is 70 per cent. It is well to remember that the maximum amount of depreciation that can be deducted is 80 per cent, which includes both physical depreciation and obsolescence.

Sale of Near-by Property.—The percentage of obsolescence may be determined indirectly by comparison with buildings similarly located where known sales have established a percentage of obsolescence which can be applied to the building under consideration.

CHAPTER VIII

BUILDING COST METHODS

Modern Systems.—In modern scientific assessing systems two methods are in general use for figuring the cost of buildings:

1. The square foot method.
2. The cubic foot method.

Both have their advantages and disadvantages, which will be discussed later. The cubic foot system is more generally used and has been found to give much more uniformly accurate and satisfactory results. Very few cities, however, use the cubic foot system exclusively, but apply it only to certain types of buildings. The experience of the writers has proved that the cubic foot method, used throughout, gives very satisfactory results, and, in order to standardize the single-unit system of applying cost factors, only the cubic foot method is recommended.

The Square Foot Method.—In determining the cost of buildings by the square foot method, the total cost of the building is divided by the building area, the area being determined by multiplying the outside dimensions of the building and the number of floors. The advantages of the square foot method are:

1. The estimated cost can be figured more quickly than by the cubic foot method.
2. An error in the assumption of the unit square foot cost does not multiply itself in the second multiplication as in the cubic foot method.
3. It eliminates the necessity of figuring the height of a building.

The disadvantages of the square foot method are:

1. It neglects the height factor in a building which is just as important as the length or width factor.
2. It assumes fixed story heights. The larger the building the greater may be the error from this factor.
3. It does not consider the difference in story heights in different parts of the same structure.
4. It does not give due consideration to the size and finish of the basement and the front and rear porches.

5. From 15 to 20 factors may be necessary in computing the cost of large office buildings.

The Cubic Foot Method.—In determining the cost of a building by the cubic foot method, the total cost of the building is divided by the number of cubic feet in the building. The advantages of the cubic foot method are:

1. It takes into consideration the height of a building and the variation in height for different parts of the building.
2. It considers every part of the building more in detail than the square foot method, such as porches, built-in features, heating, plumbing, etc.
3. It takes into consideration the different types of roof construction.
4. It is more generally used than the square foot method.
5. It gives more accurate and satisfactory results than the square foot method.

The disadvantages of the cubic foot method are:

1. An error in the assumed unit cost multiplies itself in the computation.
2. The height of a building is often difficult to secure.
3. There is no standardized system for measuring the height of a building.

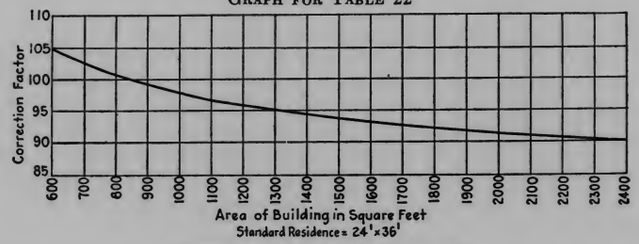
The appraiser must realize that any system devised to figure the cost of a building, without a detailed consideration of the variation in the cost, life and depreciation of the elements, must necessarily lack the high degree of accuracy required in commercial appraisals. But such refinements are not necessary or practicable in assessing.

The calculation of the cost of a building on the cubic foot basis requires a "special case" consideration when the following variables are abnormal:

1. Character of the material excavated.
2. Shape of building.
3. Number of elevators and stairways.
4. Size of windows, doors, etc.
5. Number of interior partitions.
6. Amount of plumbing.
7. Heights, floor to floor.
8. Thickness of floors constructed for different purposes.
9. Interior decorations.
10. Amount of electrical work and kind of fixtures.
11. Sprinkler systems.
12. Kind of roof trusses.
13. Number of seats in theater and size and equipment of stage.
14. Factory and warehouse spacing of columns.

On the record card, however, the appraiser should always note the additions or extras not included in the standard specifica-

GRAPH FOR TABLE 22



Correction factor for size of building.

TABLE 22.—VARIATION IN COST OF RESIDENCES DUE TO SIZE

Ratio Length to Width = 1½:1 Standard Residences = 24′ × 36′

1	2	3	4	5	6	7
Size	Area, sq. ft.	Area, % of standard bldg.	Perim., ft.	Perim., % of standard	Total cost, % of standard	Unit cost, % of standard
20′ × 30′	600	70	100	83	73.25	104.64
24′ × 36′	864	100	120	100	100.00	100.00
26′ × 39′	1,014	118	130	108	115.50	97.80
30′ × 45′	1,350	156	150	125	148.25	95.00
32′ × 48′	1,536	178	160	133	176.75	93.67
36′ × 54′	1,944	225	180	150	206.25	91.66
40′ × 60′	2,400	278	200	167	250.25	90.00

NOTE.—For a given increase in area, 75 per cent is increased directly proportional to the area increase and 25 per cent is increased directly proportional to the perimeter increase. The percentage increase in cost in column 6 is obtained as follows: Multiply the percentage of increase of area by 75 per cent and the percentage of increase of perimeter by 25 per cent and add the two results. This will give the percentage of increase in unit cost over the 24 by 36-ft. residence. The percentages obtained in column 7 are secured by dividing the percentage of increase in total cost, column 6, by the percentage of increase in area, column 3. For example: the 30 by 45-ft. residence has an increase in area of 56 per cent and an increase in perimeter of 25 per cent. Then we have,

$$75\% \times 0.56 + 25\% \times 0.25 = 48.25$$

and

$$\frac{148.25}{156} = 95.0\%$$

tions. Such extras are generally minor factors, but in some cases they may become major factors of importance.

Effect of Size upon Cost of Residences.—A common criticism of the valuation of a building by the cubic foot or square foot methods is that it neglects the variation in cost per unit due to the size of buildings of similar construction. It is true that for buildings of like construction the unit cost per square foot or cubic foot decreases as the size of the building increases and this increase is not always in direct proportion to the size of the building.

In making a study of the subject we find that for buildings of similar construction the excavation, concrete and wood floors, interior lumber and millwork, plastering, painting, heating and plumbing vary in cost almost in direct proportion to the size of the building. This is not true with brickwork, however.

The only variables which influence the difference in unit cost are the exterior brick and concrete walls. Table 22 shows the variation in cost of different size residences having a standard ratio of length to width equal to 1½:1.

Effect of Shape upon Cost of Building.—The most economical structure to build is a square building. The effect of the shape of a building upon the cost should not be neglected by the appraiser using the cubic foot method.

Construction practice has quite definitely fixed the ratio of length to the width of buildings of various types. Figure 14

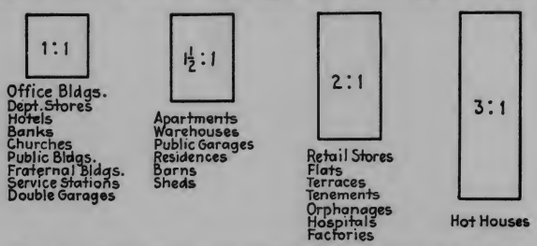
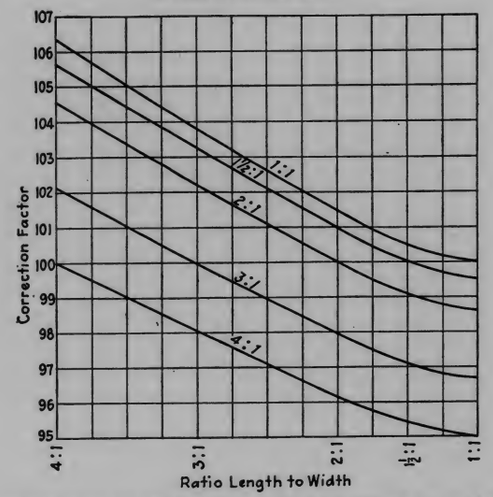


FIG. 14.—Ratio of length to width for various types of buildings.

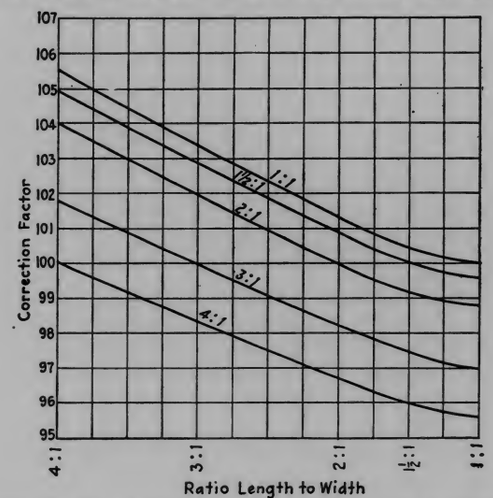
shows the generally accepted ratios of various types of buildings which have been used in giving the costs of standard buildings in the chapters which follow.

Table 23 gives the variation in cost of buildings due to shape and the charts which follow are the platted results of the table.

GRAPHS FOR TABLE 23



Correction factor for variation in cost of brick buildings due to shape.



Correction factor for variation in cost of frame buildings due to shape

TABLE 23.—VARIATION IN COST OF BUILDINGS DUE TO SHAPE
(Areas Constant)

Standard, ratio length to width	Ratio, length to width of bldg.	Perim., % of standard	Brick bldg., cost, % of standard	Frame bldg., cost, % of standard
1:1	1:1	100.0	100.0	100.0
"	1½:1	102.0	100.5	100.4
"	2:1	106.0	101.5	101.3
"	3:1	115.3	103.8	103.4
"	4:1	125.0	106.3	105.5
1½:1	1:1	98.0	99.5	99.6
"	1½:1	100.0	100.0	100.0
"	2:1	103.9	101.0	100.9
"	3:1	113.0	103.3	102.9
"	4:1	122.5	105.6	104.9
2:1	1:1	94.3	98.6	98.8
"	1½:1	96.3	99.1	99.2
"	2:1	100.0	100.0	100.0
"	3:1	108.8	102.2	101.9
"	4:1	118.0	104.5	104.0
3:1	1:1	86.6	96.7	97.0
"	1½:1	88.5	97.1	97.5
"	2:1	91.9	98.0	98.2
"	3:1	100.0	100.0	100.0
"	4:1	108.3	102.1	101.8
4:1	1:1	80.0	95.0	95.6
"	1½:1	81.6	95.4	96.0
"	2:1	84.8	96.2	96.7
"	3:1	92.4	98.1	98.3
"	4:1	100.0	100.0	100.0

NOTE.—In a brick house with full basement, concrete basement walls and brick superstructure, the walls are 25 per cent of the total cost of building and for frame superstructure with concrete basement walls, the walls are 22 per cent of the total cost of the building.

Buildings also vary in cost due to the area of the building. A number of cities have standardized the area for each classified building and made deductions in unit cost for additional areas and additions in unit cost for smaller areas than those specified under the classification schedules. These are given in the chapters which follow.

In the following chapters gable roofs are considered to have one-quarter pitch. For roofs having a pitch more or less than one-quarter, corrections should be made as shown in Table 143.

Comparative costs of roofs of various types are given in Table 145. Corrections for the type of roof should be made where the roof differs from that called for in the standard classifications.

Figuring the Cubage of a Building.—At the present time there are no standard rules for measuring the cubage of a building. It is hoped that the rules herein set forth may assist in establishing a standard practice among appraisers and assessors. The American Institute of Architects has attempted to establish a definite rule for figuring cubage, and the tentative rules which they have published still leave much to be desired.

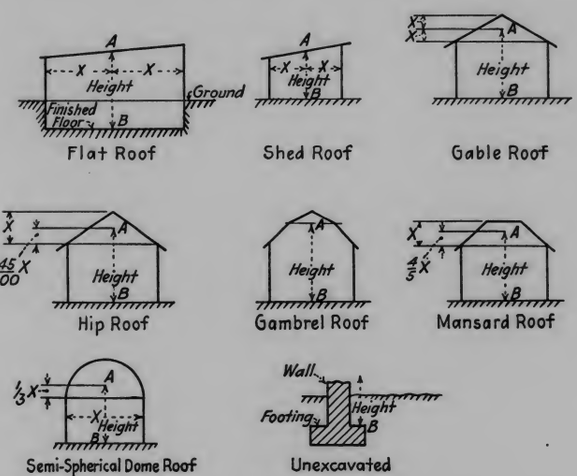


FIG. 15.—Height of buildings.

After giving due thought and consideration to widely differing methods for figuring cubage in many cities of the United States and also as a result of practical experience in devising cost systems for a number of cities, the authors submit the following rules for figuring the cubage of a building:

The cubical content of any building is the actual number of cubic feet contained within the exterior surfaces of the outside walls and between the lowest floor (first floor or basement floor) and the exterior roof surface.

For the purpose of defining the height *A-B* of a building, let *A* be the upper point and *B* the lower point of said height *A-B* (see Fig. 15).

For a flat roof, shed roof or lean-to roof, *A* is the point of intersection of the diagonals of the roof surface parallelogram.

For a gable roof building, the height should be computed as though the building were square, having the same area and pitch of roof as the building in question; then *A* is the point midway between the top of the exterior wall at the roof line and the peak of the roof for the square building.

For a hip roof building, *A* is the point $^{45}/_{100}$ of the distance from the top of the exterior wall at the roof line, to the peak of the roof, measured up from the exterior wall at the roof line.

For a gambrel roof, *A* is the point of break in the roof line.

For a mansard roof, determine the vertical distance between the top of the exterior wall at the roof line and the top of the roof. *A* is a point $^4/_5$ of this distance measured up from the exterior wall at the roof line.

For a semispherical dome roof, *A* is $^1/_3$ the diameter above the base of the dome.

For a building having a finished basement floor, *B* is the top of the basement floor.

For the building having an unfinished basement floor, *B* is the top of the exterior wall footing.

For the unexcavated portion of a building *B* is the top of the exterior wall footing.

All projections from the main exterior walls of a building and similar in construction thereto containing more than 20 sq. ft. in area shall be figured separately and the cubical contents added to that of the main building.

All other projections such as porches, penthouses, ventilators, tanks, skylights, sheds, etc., shall be figured separately. Excessive foundation construction shall be figured separately.

Determining Building Costs.—The information on the cost of buildings in the following chapters was secured from several hundred reliable sources. Practically every large city in the United States where modern methods are used has contributed some information on the subject. Contractors, architects, builders, realtors, statisticans and authors have been consulted and have supplied a wealth of information from their experiences.

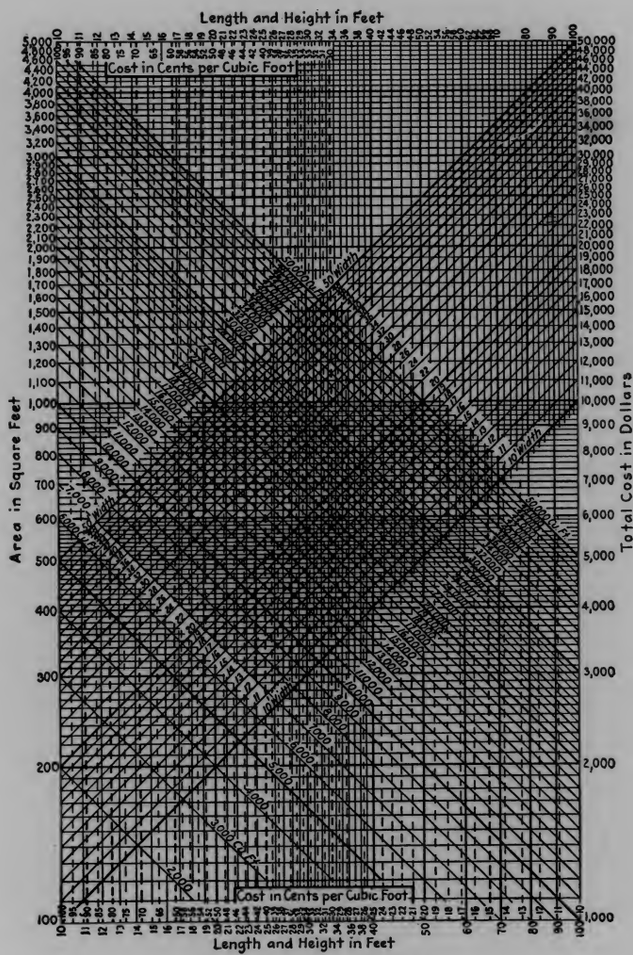


FIG. 16.—Cost of residences.

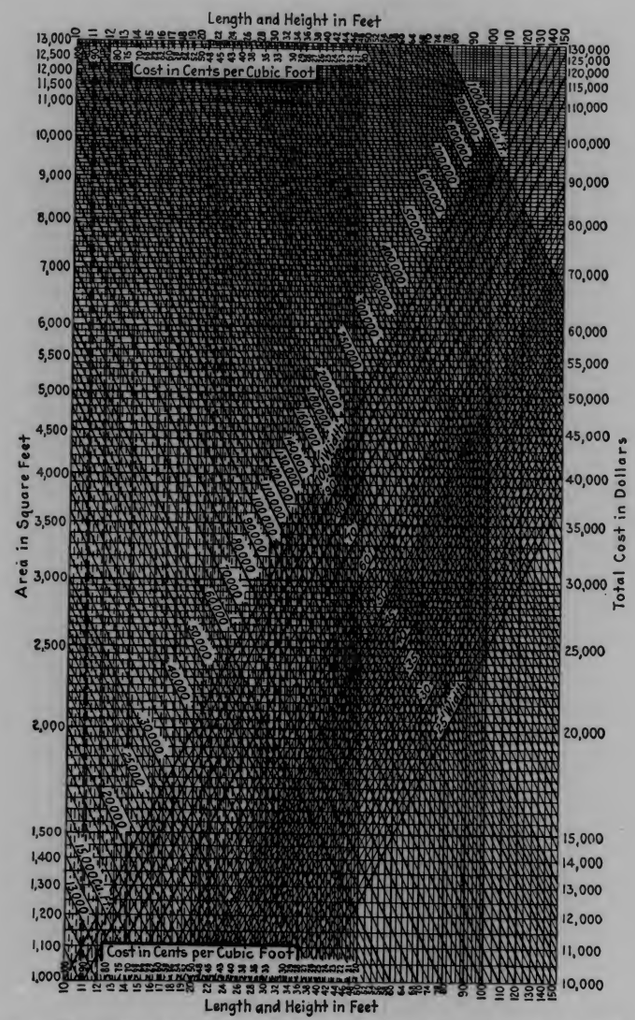


FIG. 17.— Cost of store, office, apartment, warehouse, and factory buildings.

Every assessor contemplating the use of these or similar cost figures should continually check them by information secured from local sources and should not hesitate to amend the suggested classifications and figures to meet local conditions. All information on local changes in the cost of building labor and materials from time to time should be studied and allowance made for their possible influence on local building cost.

The charts shown in Figs. 16 and 17 were designed by W. L. Prouty for the rapid computation of building values when the length, width, height and cost per cubic foot of the building are given. Figure 16 is designed for residences and Fig. 17 is designed for store, office and apartment buildings. The use of these charts will be illustrated by the following examples:

Example 1.—What is the value of a 5-room brick residence where the length is 40 ft., the width 24 ft., the height 20 ft. and the cost per cubic foot 28¢?

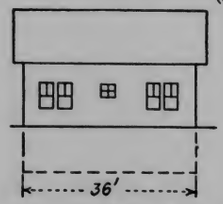
Enter the cost chart (Fig. 16) at either top or bottom for a length of 40 ft. Follow this line to where it intersects the line for width equal 24 ft. The area, 960 sq. ft., is read on the left-hand margin of the chart. Retrace same horizontal line to intersect vertical line reading from either top or bottom for height of 20 ft. and the diagonal cubic foot line reads 19,200. Follow this line parallel with the cubic foot lines to intersect the vertical dash line 28¢ per cubic foot read at the bottom of the chart. Follow the horizontal line intersected to the right margin and read cost of building equals $5,376.

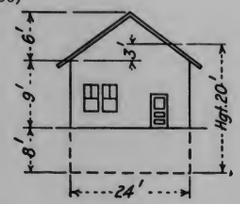
Example 2.—What is the value of a store building where the length is 120 ft., the width 50 ft., the height 60 ft. and the cost per cubic foot 32¢?

Enter the chart (Fig. 17) at either the top or bottom where the length is 120 ft. Follow this line to where it intersects the line for width equal 50 ft. The area, 6,000 sq. ft., is read on the left-hand margin of the chart. Retrace the same horizontal line to intersect vertical line reading from either top or bottom for height of 60 ft. and the diagonal cubic foot line reads 360,000. Follow this line parallel with the cubic foot lines to intersect the vertical dash line 26¢ per cubic foot. Follow the horizontal line intersected to the right margin and read total cost of building equals $93,600.

Examples.—On the following pages are four examples showing the methods used in figuring the value of buildings.

EXAMPLE 1.—DENVER SYSTEM, COST OF RESIDENCE.
(See Table 24 p. 106)





Description

Class, frame C residence, medium const.
Height, 1 story; 20'-0"
Foundation, concrete
Basement, full, concrete floor.
Roof, gable, wood shingle.
Plumbing, modern, sink, bathtub, toilet washbowl.
Heating, hot air furnace.
Built-in-features, kitchen cabinets, colonnades, bookcases, mantel fireplace.
First floor, 5 rooms.
Finish, fir floors and finish
Age, 6 yrs.
Estimated life, 50 yr. Table 24
Obsolescence, none.

Appraisal

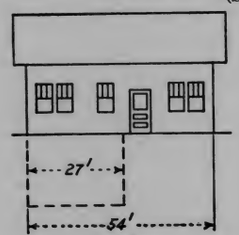
Cubic feet
24' × 36' × 20' = 17,280 cu. ft.

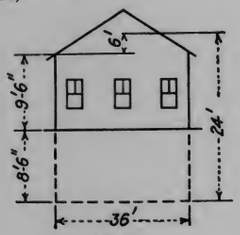
Base cost
17,280 cu. ft. × 18¢ (Table 24) = $3,110

Depreciation
6 yrs. @ 2% (Table 24) = 12 %
$3,110 × 12 % = $373

Present value
$3,110 − $373 = $2,737

EXAMPLE 2.—DENVER SYSTEM, COST OF RESIDENCE.
(See Table 24 p. 106)





Description

Class, frame C residence, good const.
Height, 1 story, basement, 8'-6", first floor 9'-6", total height, 24'-0"
Foundation, stone
Basement, ¼, concrete floor.
Roof, gable, wood shingle
Plumbing, old style, sink, bathtub, toilet, washbowl
Heating, stove
Built-in features, kitchen cabinet, colonnades, bookcases, mantel, fireplace
First floor, 7 rooms
Finish, fir floors and fir finish
Age, 35 yrs.
Estimated life, 60 yr.
Obsolescence-District has changed during past 10 yr. from residence to business. Business occupies 15% of district. Table 20 shows that 10% obsolescence should be applied. This is substantiated by investigation of property.

Appraisal

Cubic feet

$$36' \times 54' \times \left(\frac{8.5}{2} + 9.5 + 6.0\right) =$$

1,944 × 19.75 = 38,394 cu. ft.

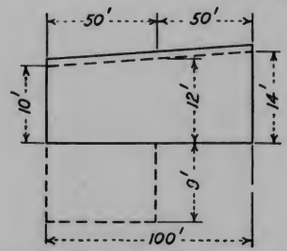
Base cost
Base cubic foot cost is 20¢ but due to extra large cubage, multiply 20¢ × 91.66 % (Table 22)
Use cost, 18.33¢
For half basement add 2¢ per cubic foot = 20.33¢
38,394 cu. ft. × 20.33¢ = $7,806

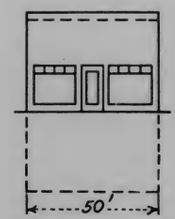
Depreciation
35 yr. @ 1.7 % = 59.5 %
$7,806 × 59.5 % = $4,645

Obsolescence
$7,806 × 10 % = $781

Present value
$7,806 − $4,645 − $781 = $2,380 = present value.

EXAMPLE 3.—DENVER SYSTEM, COST OF STORE BUILDING.
(See Table 78 p. 170)





Description

Class, brick A store bldg., good const.
Height, 1 story, ½ basement, 9 ft., first floor 12 ft., total height = 16.5'
Foundation, concrete
Basement, ½, concrete floor
Roof, flat, tar and gravel
Plumbing, 1 sink, 1 toilet
Heating, steam
Built-in features, none
First floor, 1 large salesroom, 1 small storeroom
Finish, fir floors and finish
Age, 10 yr.
Estimated life, 40 yr.
Obsolescence, none

Appraisal

Cubic feet
100' × 50' × 16.5' = 82.500 cu. ft.

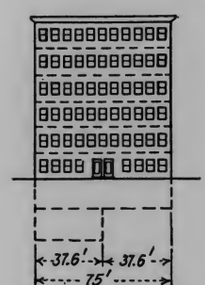
Base cost
82,500 cu. ft. × 18¢ (Table 78) = $14,850

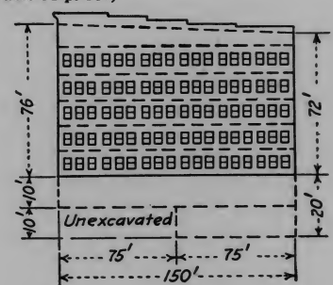
Extras
Standard specifications call for hot air heat. For steam heat add $500.

Depreciation
10 yr. @ 2.5 % (Table 78) = 25 %
($14,850 + 500) × 25 % = $3,838

Present value
$14,850 + $500 − $3,838 = $11,512

EXAMPLE 4.—DENVER SYSTEM, COST OF OFFICE BUILDING.
(See Table 91 p. 187)





Description

Class, steel frame C office bldg., good const.
Height, 6 stories, basement and sub-basement: total height, 94'
Foundation concrete
Basement full, no finish
Subbasement, ¼, no finish
Plumbing, 2 tile and marble finished lavatories each floor and 1 plain lavatory in basement
Heating, steam
Built-in features, small vault each room above 2nd floor
Exterior walls, brick with terra-cotta trim
Interior construction, fire resisting, steel frame, reinf. conc. floors, hollow tile walls, tile floor in halls, lobbies and lavoratories, metal stairways, suites of 1 to 3 rooms
Age, 4 yr.
Estimated life, 75 yr. (Table 91)
Obsolescence, none

Appraisal

Cubic feet
(75' × 150' × 84') + (75' × 75' × 10') = 945,000 + 56,250 = 1,001,250 cu. ft.

Base cost
Base cost, 43¢ cu. ft. but due to shape of building, the length being twice the width, the cubic feet cost will be 43¢ × 101.5 % (Table 23) = 43.6¢
1,001,250 cu. ft. × 43.6¢ = $436,545

Depreciation
4 yr. @ 1.3 % (Table 91) = 5.2 %
436,545 × 5.2 % = $22,700

Present value
$436,545 − $22,700 = $413,845.

CHAPTER IX

RESIDENCE BUILDINGS

Standard Systems. After having made an extensive study of building appraisal systems now in use by a large number of cities in the United States, the authors submit herewith a number of the best systems which have given very satisfactory results wherever they have been used. A study of local conditions in any community will soon convince one of the fact that no single system is universally applicable and that any system which may be adopted locally must be given careful and discriminating consideration. A minutely detailed system will involve considerable expense and a system which has only a general application is not conducive of good results. The building appraisal systems given in the following chapters present classifications and costs per cubic foot which the assessor may use as a guide in his own local work.

In the tables used in the following chapters these abbreviations have been used for plumbing, heating and built-in fixtures:

S. = kitchen sink.
B. = bath tub.
T. = toilet.
W. = wash bowl.
L. = laundry tubs.
K. = kitchen cabinet.
M. = mantel.
F. = fireplace.
Bu. = buffet.
C. = china closet.
Col. = colonnade.
Bk. = bookcase.
Lin. = linen closet.
H. A. = hot-air furnace.
H. W. = hot-water heating plant.

Table 24 gives the classification and cost of single residences in Denver.

FIG. 18.—Denver single residence, frame C.
NOTE.—See Table 24.

FIG. 19.—Denver single residence, brick A.
NOTE.—See Table 24.

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FIG. 18.—Denver single residence, frame C.
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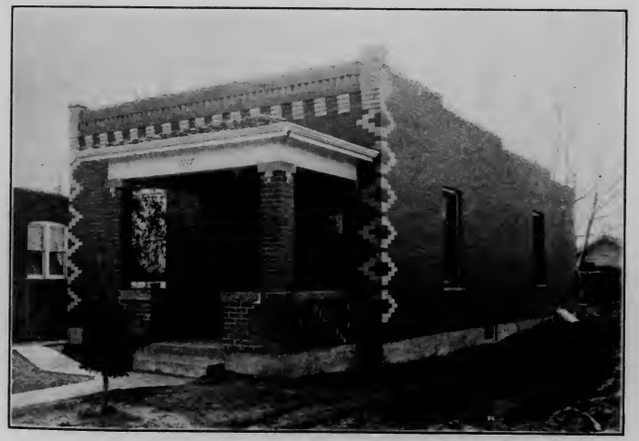

FIG. 19.—Denver single residence, brick A.
NOTE.—See Table 24.

TABLE 24.—DENVER (1930)—SINGLE RESIDENCES

Classification No. 1

Class	Cost cu. ft., ¢			Life, years			Ann. phys. dep., %			Stories	Base-ment	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Frame A	13	15	17	20	25	30	5.0	4.0	3.3	1	None	None	None	Br. or Conc.
" B	15	17	19	30	35	40	3.3	2.9	2.5	1	½	Conc.	"	" " "
" C	16	18	20	40	50	60	2.5	2.0	1.7	1	Full	"	"	" " "
" D	18	20	22	30	40	50	3.3	2.5	2.0	2	"	"	"	" " "
" E	20	22	24	40	50	60	2.5	2.0	1.7	2	"	"	½	" " "
Brick A	17	18	19	30	40	50	3.3	2.5	2.0	1	None	None	None	" " "
" B	20	21	22	50	55	65	2.0	1.8	1.5	1	½	Conc.	"	" " "
" C	20	22	24	50	55	65	2.0	1.8	1.5	1	Full	"	"	" " "
" D	27	29	31	65	70	80	1.5	1.4	1.25	1	"	"	1 fin. rm.	" " "
" E	22	23	24	50	55	65	2.0	1.8	1.5	1½	½	"	None	" " "
" F	24	25	26	50	55	65	2.0	1.8	1.5	2	Full	"	"	" " "
" G	30	35	40	55	65	75	1.8	1.5	1.3	1½	Small	"	"	Conc.
" H	40	50	60	70	80	90	1.4	1.25	1.1	2 or more	½ to full	"	All	"
" I	35	45	55	65	70	80	1.5	1.4	1.25	" " "	Full	Conc. or wood	Den, bedroom, & laundry	Br. stone or conc.
Stone A	33	35	37	80	100	120	1.25	1.0	0.8	" " "	"	Conc.	None	" " "

TABLE 24.—DENVER (1930)—SINGLE RESIDENCES.—(*Continued*)

Class	Finish	Porches	Roof	Floors	Heat	Plumbing	Built-in features	Remarks
Frame A	Siding out, plaster in	Very small	Gable, shingle or paper	Soft	Stove	S.	None	Non-fire resist.
" B	" " " "	Medium	Gable, shingle	"	H. A.	S. B. T. W.	K.	" " "
" C	" " " "	"	" "	"	" "	" "	Col. M. F.	" " "
" D	" " " "	Large	" "	"	" "	" "	K. Bk.	" " "
" E	" " " "	"	" "	Hard	H. W.	S. B. T. W. L.	K. C. M. F.	" " "
Brick A	Brick out, plaster in	Very small	Flat	Soft	Stove	S.	" "	" " "
" B	" " " "	Medium	Gable, shingle	"	H. A.	S. B. T. W.	None	" " "
" C	" " " "	Large	" "	"	" "	S. B. T. W. L.	K.	" " "
" D	" " " "	"	" "	Hard	Steam or H. W.	S. B. 2 T. W. L.	K. Lin. M. F.	" " "
" E	" " " "	Medium	" "	Soft	H. A.	S. B. T. W.	K. Lin. M. 2 F. Bk. Bu.	" " "
" F	" " " "	Large	" "	"	Steam or H. W.	" "	K. M. F.	Tile bath
" G	Br. tile, stucco out, plaster in	None	Gable, hip, wood or comp. shingle	Hard	H. W.	S. B. T. W. L.	K. Col. Bu. M. F.	Non-fire resist.
" H	" " " "	"	Gable or hip, tile	"	Vapor or H. W.	S. L. and 2 or more B. T. W.	K. Lin F. Bk.	" " "
" I	Brick or tile, orn. plaster	Large	Gable, slate or tile	"	Steam or H. W.	" " "	2 F. Lin.	Tile bath
Stone A	Stone walls, plaster in	"	" " " "	"	" " "	S. B. T. W.	K. Bk.	" "
							2 F. Bk. K. K. Bu. M. F.	Non-fire resist. " " "

NOTE.—Kellastone on frame takes the same rate as a good constructed frame residence.
Cement stucco on frame takes the same rate as an average constructed frame residence.
Where the standard classification for frame residences calls for ½ basement deduct 2¢ per cu. ft. for full basement.
Where the standard classification for frame residences calls for full basement add 2¢ per cu. ft. for ½ basement.
Where the standard classification for brick residences calls for ½ basement deduct 3¢ per cu. ft. for full basement.
Where the standard classification for brick residences calls for full basement add 3¢ per cu. ft. for ½ basement.
For brick C and brick D when cubage is over 25,000, deduct 1¢ from cubic foot rate.
For brick C and brick D when cubage is under 18,000, add 1¢ to cubic foot rate.
Brick G is English type costing from $10,000 to $25,000.
Brick H is English type costing from $25,000 to $50,000.
Brick I is old type mansion.
City ordinance prohibits frame buildings in better class residence districts.

FIG. 20.—Denver single residence frame D.
NOTE.—See Table 24.

FIG. 21.—Denver single residence, brick D.
NOTE.—See Table 24.

TABLE 25.—CLEVELAND (1930)—SINGLE RESIDENCES

	Class 1			Class 2			Class 3			Class 4			Class 5	
Stories	1	1½	2	1	1½	2	1	1½	2	1	1½	2	1	
Frame, sq. ft.	$1.50	$2.25	$2.70	$2.40	$3.75	$4.50	$3.60	$4.80	$5.40	$4.80	$5.70	$6.30	$6.00	
" cu. ft.	0.10	0.11	0.108	0.105	0.132	0.135	0.195	0.193	0.182	0.243	0.246	0.227	0.26	
Brick, sq. ft.	1.70	2.50	3.00	2.70	4.20	5.00	4.00	5.30	6.00	5.20	6.30	6.90	6.60	
" cu. ft.	0.106	0.135	0.125	0.117	0.15	0.152	0.218	0.214	0.20	0.27	0.268	0.248	0.287	
Walls	Siding without sheeting			Narrow siding			Narrow siding			Narrow siding			Narrow siding	
Basement	None			Full basement, cement block foundation			Full basement, brick and tile foundation			Full basement, brick and tile foundation			Full basement, brick and tile foundation	
Roof	Wood shingle			Wood shingle			Optional except tile			Optional except tile			Optional except tile	
Attic	None			Unfinished			Unfinished			Plastered, Undivided area			Plastered, undivided area	
Projections	"			Porch, 150 sq. ft.			2 bays or dormers			Not over 2 dormers or bays			1 outside chimney, 10-ft. porch	
Interior finish	Pine floors and finish			Pine floors and finish			Porch, 250 sq. ft. H. W. floors and finish, 1 mantel			H. W. floors and finish, built-in features			H. W. floors and finish, built-in features	
Plumbing	T. S.			B. T. S. wood floor			B. T. S. wood floor			B. T. S. W. wood floor			B. T. S. W. tile floor	
Heating	Stove			Stove			H. A.			H. A.			H. W. steam or vapor	
Area	Optional			Optional			650 sq. ft.			650 sq. ft.			1,200 sq. ft.	

Square foot costs from Zangerle's "Principles of Real Estate Appraising." Only 5 of 12 classifications are shown in this table.
NOTE.—Cubic foot costs were computed by authors.

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Stories	1	1½	2	1	1½	2	1	1½	2	1	1½	2	1	
Frame, sq. ft.	$1.50	$2.25	$2.70	$2.40	$3.75	$4.50	$3.60	$4.80	$5.40	$4.80	$5.70	$6.30	$6.00	
" cu. ft.	0.10	0.11	0.108	0.105	0.132	0.135	0.195	0.193	0.182	0.243	0.246	0.227	0.26	
Brick, sq. ft.	1.70	2.50	3.00	2.70	4.20	5.00	4.00	5.30	6.00	5.20	6.30	6.90	6.60	
" cu. ft.	0.106	0.135	0.125	0.117	0.15	0.152	0.218	0.214	0.20	0.27	0.268	0.248	0.287	
Walls	Siding without sheeting			Narrow siding			Narrow siding			Narrow siding			Narrow siding	
Basement	None			Full basement, cement block foundation			Full basement, brick and tile foundation			Full basement, brick and tile foundation			Full basement, brick and tile foundation	
Roof	Wood shingle			Wood shingle			Optional except tile			Optional except tile			Optional except tile	
Attic	None			Unfinished			Unfinished			Plastered, Undivided area			Plastered, undivided area	
Projections	"			Porch, 150 sq. ft.			2 bays or dormers Porch, 250 sq. ft.			Not over 2 dormers or bays			1 outside chimney, 10-ft. porch	
Interior finish	Pine floors and finish			Pine floors and finish			H. W. floors and finish, 1 mantel			H. W. floors and finish, built-in features			H. W. floors and finish, built-in features	
Plumbing	T. S.			B. T. S. wood floor			B. T. S. wood floor			B. T. S. W. wood floor			B. T. S. W. tile floor	
Heating	Stove			Stove			H. A.			H. A.			H. W. steam or vapor	
Area	Optional			Optional			650 sq. ft.			650 sq. ft.			1,200 sq. ft	

Square foot costs from Zangerle's "Principles of Real Estate Appraising." Only 5 of 12 classifications are shown in this table.
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TABLE 26.—CLEVELAND PHYSICAL DEPRECIATION OF BUILDINGS[1]

Per Cent

Age, years	Frame residences and stores	Brick residences and stores	Non-fireproof apartments and hotels	Fireproof apartments and hotels	Fireproof stores and office bldgs.	Fireproof industrial bldgs.	Non-fireproof industrial bldgs.
1	2	2	3	1½	1½	1½	1½
2	4	4	6	3	3	3	3
3	6	6	9	4½	4½	4½	4½
4	8	8	12	6	6	6	6
5	10	10	15	7½	7½	7½	7½
6	12	11½	17½	9	9	9	9
7	14	13	20	10½	10	10½	10½
8	16	14½	22½	12	11	12	12
9	18	16	25	13½	12	13½	13½
10	20	17½	27½	15	13	15	15
11	21½	19	30	16½	14	16	16½
12	23	20	32	18	15	17	18
13	24½	21	34	19½	16	18	19½
14	26	22	36	21	17	19	21
15	27½	23	38	22½	18	20	22½
20	33	28	48	30	23	25	30
25	38	33	55½	37½	28	30	37½
30	43	38	63	45	33	35	45
35	48	43	70½	52½	38	40	52½
40	53	48	75	60	43	45	60
45	58	53	80	67½	48	50	67½
50	63	58	80	75	53	55	75

[1] From Zangerle's "Principles of Real Estate Appraising."

TABLE 27.—ROCHESTER (1930)—SINGLE RESIDENCES

Old Style

	Class 1-A	Class 1-B	Class 1-C	Class 1-D	Class 1-E		Class 1-F		Class 1-G	
Stories	1	1½	2	2	2	2½	2	2½	2	2½
Frame, sq. ft.	$4.00	$4.50	$5.00	$5.50	$6.00	$6.72	$8.00	$ 8.96	$10.00	$11.20
" cu. ft.	0.25	0.25	0.17	0.18½	0.20	0.20	0.26½	0.28	0.33½	0.35
Brick, sq. ft.	4.60	5.17	5.75	6.32	6.90	7.73	9.20	10.30	11.50	12.88
" cu. ft.	0.29	0.29	0.20	0.21	0.23	0.23	0.30½	0.32	0.38½	0.40
Walls	Frame shingle and 6" siding, brick, common	Frame shingle and 6" siding, brick, common	Frame shingle and 6" siding, brick, common	Frame shingle and 6" siding, brick, face	Frame shingle and 6" siding, brick, face		Frame shingle and 6" siding, brick, face		Frame shingle and 6" siding, brick, face	
Basement	Small to ½ dirt floor	Small to ½ dirt floor	Full, conc. floor	Full, conc. floor	Full, conc. floor		Full, conc. floor		Full, conc. floor	
Roof	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles		Gable, wood shingles		Gable, wood shingles	
Attic	None	None	None	Unfinished	Unfinished		Unfinished		Unfinished	
Interior finish	Pine	Pine	Pine	Pine	Hardwood		Hardwood		Hardwood	
Floors	Pine	Pine	Pine	Pine	Oak		Oak		Oak	
Plumbing	Old style, B. S. T. W., H. W. boiler	Old style, B. S. T. W., H. W. boiler	Old style, B. S. L. T. W., H. W. boiler	Modern, B. S. L. T. W., H. W. boiler	Modern, B. S. L. T. W., H. W. boiler		Modern, B. S. L. T. W. 1 B. for each 1,000 sq. ft.		Modern, B. S. L. W. 1 B. for each 1,000 sq. ft.	
Heating	Stove	Stove	H. A.	H. A.	H. A.		H. A.		H. A.	
Remarks	Cheap const., low, small pitch roof	Good const., high, steep pitch roof	Cheap const., low pitch roof	Good const., steep pitch roof	Good const., high, steep pitch roof		Good const., ornamental finish		Best const., ornamental finish	

NOTE.—Cubic foot costs were computed by authors.

NOTE.—No physical depreciation during first 10 years of life allowed, average thereafter equals 1½ per cent per annum. Maximum depreciation 70 per cent. Figures do not include porches. Costs include some allowance for depreciation and obsolescence cost based on *Eng. News-Record* index.

TABLE 28.—ROCHESTER (1930)—SINGLE RESIDENCES

New Style

	Class 2-A			Class 2-B			Class 2-C			Class 2-D			
Stories	1	1½	2	1	1½	2	1	1½	2	1	1½	2	2½
Frame shingle and 6″ siding, sq. ft.	$2.72	$3.36	$4.00	$5.10	$6.30	$7.50	$5.44	$6.72	$8.00	$6.46	$7.98	$ 9.50	$10.64
" " " " " cu. ft.	0.19½	0.21	0.17½	0.25½	0.28½	0.25	0.27	0.30½	0.26½	0.32½	0.36	0.31½	0.33½
Frame 8″–10″ siding, sq. ft.	2.77	3.43	4.08	.....	.....	.....	5.55	6.85	8.16	6.59	8.14	9.69	10.85
" " " cu. ft.	0.20	0.21½	0.17¾	.....	.....	.....	0.28	0.31	0.27	0.33	0.37	0.32	0.34
Frame plaster and stucco, sq. ft.	2.83	3.49	4.16	.....	.....	.....	5.66	6.99	8.32	6.72	8.30	9.88	11.07
" " " " cu. ft.	0.20½	0.22	0.18	.....	.....	.....	0.28½	0.31½	0.27½	0.33½	0.38	0.33	0.34½
Brick veneer, sq. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	7.11	8.78	10.45	11.70
" " cu. ft.	.....	.....	.....	.....	.....	.....	.....	.....	.....	0.35½	0.40	0.35	0.36½
Tile or block plaster & stucco, sq. ft.													
" " " " " cu. ft.													
Tile or block with brick veneer, sq. ft.													
" " " " " " cu. ft.													
Walls	As described			As described			As described			As described			
Basement	None			Full conc. floor			Full conc. floor			Full conc. floor			
Roof	Gable, wood shingles			Gable, wood shingles			Gable, wood shingles			Gable, wood shingles			
Attic	None			Unfinished			Unfinished			Unfinished			
Interior finish	Pine			Pine			Hardwood or gum			Hardwood or gum			
Floors	Oak			Oak			Oak			Oak			
Plumbing	B. S. T. W., H. W. boiler			B. S. T. W. L., H. W. boiler			B. S. T. W. L., H. W. boiler			B. S. T. W. L., H. W. boiler			
Heating	Stove			H. A.			H. A.			H. A.			
Authors' remarks	Cheap const., no built-in features			Few built-in features, plain millwork			Medium const. built-in fixt plain millwork			Well built, may have brick entrance tile vest. face brick			

TABLE 28.—ROCHESTER (1930)—SINGLE RESIDENCES.—(*Continued*)

	Class 2-E				Class 2-F				Class 2-G			
Stories	1	1½	2	2½	1	1½	2	2½	1	1½	2	2½
Frame shingle and 6″ siding, sq. ft.	$7.14	$8.82	$10.50	$11.76	$8.50	$10.50	$12.50	$14.00	$ 9.52	$11.76	$14.00	$15.68
" " " " " cu. ft.	0.35½	0.40	0.35	0.37	0.42½	0.48	0.41½	0.44	0.47½	0.53½	0.46½	0.49
Frame 8″–10″ siding, sq. ft.	7.28	9.00	10.71	12.00	8.67	10.71	12.75	14.28	9.71	12.00	14.28	15.99
" " " cu. ft.	0.36½	0.41	0.36	0.37½	0.43½	0.49	0.42½	0.44½	0.48½	0.54½	0.47½	0.50
Frame plaster and stucco, sq. ft.	7.43	9.17	10.92	12.23	8.84	10.92	13.00	14.56	9.90	12.23	14.56	16.31
" " " " cu. ft.	0.37	0.41½	0.36½	0.38½	0.44	0.49½	0.43½	0.45½	0.49½	0.55½	0.48½	0.51
Brick veneer, sq. ft.	7.85	9.70	11.55	12.94	9.35	11.55	13.75	15.40	10.47	12.94	15.40	17.25
" " cu. ft.	0.39	0.44	0.38½	0.40½	0.47	0.52½	0.46	0.48	0.52½	0.59	0.51½	0.54
Tile or block plaster & stucco, sq. ft.	.....	.....	.....	.....	9.26	11.44	13.62	15.25	10.38	12.82	15.26	17.09
" " " " " cu. ft.	.....	.....	.....	.....	0.46	0.52	0.45½	0.48	0.52	0.58	0.51	0.53½
Tile or block with brick veneer, sq. ft.	.....	.....	.....	.....	9.77	12.07	14.37	16.10	10.95	13.52	16.10	18.03
" " " " " " cu. ft.	.....	.....	.....	.....	0.49	0.55	0.48	0.50	0.55	0.61½	0.53½	0.56½
Walls	As described				As described				As described			
Basement	Full conc. floor				Full conc. floor				Full conc. floor			
Roof	Gable, wood shingles				Gable, wood shingles				Gable, wood shingles			
Attic	Unfinished				Unfinished				Unfinished			
Interior finish	Hardwood or gum				Hardwood or gum				H. W. or gum, heavy trim may be covered			
Floors	Oak				Oak				Oak			
Plumbing	B. S. T. W. L., H. W. boiler, tile floor				B. S. T. W. L., H. W. boiler automatic heater, 1 B. each 800 sq. ft.				B. S. T. W. L., H. W. boiler, automatic heater, 1 B. each 600 sq. ft.			
Heating	H. A.				H. W., steam vapor				H. W., steam vapor			
Authors' remarks	Architectural details, good construction				Old English or Colonial types, high class				Well-built, highest type of residence			

NOTE.—Cubic foot costs computed by authors.

TABLE 29.—PORTLAND, ORE. (1926)—SINGLE RESIDENCES

	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
Cost, sq. ft.	$3.75	$2.95	$3.90	$4.60	$4.35	$5.00	$3.90
" cu. ft.	0.23½	0.18½	0.22½	0.23	0.24	0.25	0.19½
Standard area	560 sq. ft.	560 sq. ft.	616 sq. ft.	616 sq. ft.	720 sq. ft.	720 sq. ft.	720 sq. ft.
Number rooms	2 to 4	2 to 4	4 and 5	4 and 5	4 and 5	4 and 5	5
Construction	Average	Poor	Poor	Average	Average	Good	Average
Foundation	Conc.	Conc.	Conc.	Conc.	Conc.	Conc.	Conc.
Basement	½, conc. floor	½, dirt floor	⅔	Full	⅔, conc. floor	Full, conc. floor	Full, conc. floor
Walls	Frame siding	Frame siding	Frame siding	Stucco on frame	Frame siding	Stucco on frame	Frame siding
Roof	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles
Attic	None	None	None	2 rooms	None	None	Not finished
Projections	None	None	1 bay window	None	1 bay wdo., 1 porch	1 porch	1 porch
Interior finish	Fir, plastered	Fir, papered	Fir, plastered, 1 rm., H. W. floor	Fir, plastered, 3 rms., H. W. floor	Fir, plastered, 1 rm. H. W. floor	Fir, plastered, 3 rms. H. W. floor	Fir, plastered, 3 rms. H. W. floor
Built-in features	None	None	None	None	None	None	Bk., Bu., cabinet
Plumbing	S. B. T. W. L.	S. B. T. W.	S. B. T. W. L.	S. B. T. W. L.	S. B. T. W. L.	S. B. T. W. L.	S. B. T. W. L.
Heating	H. A., pipeless	Stove	H. A.	H. A.	H. A.	H. A., F.	H. A., F.
Authors' remarks							

TABLE 29.—PORTLAND, ORE. (1926)—SINGLE RESIDENCES.—(*Continued*)

	Class 8	Class 9	Class 10	Class 11	Class 12	Class 13	Class 14
Cost, sq. ft.	$3.95	$3.90	$6.00	$7.10	$6.00	$7.70	$11.00
" cu. ft.	0.21	0.18	0.19½	0.26	0.31½	0.32	0.46
Standard area	900 sq. ft.	1,300 sq. ft.	1,200 sq. ft.	1,274 sq. ft.	1,058 sq. ft.	1,217 sq. ft.	1,625 sq. ft.
Number rooms	5	6	8	6	5	6	8
Construction	Good	Good	Good	Good	Good	Good	Good
Foundation	Conc.	Conc.	Conc.	Conc.	Conc.	Conc.	Conc.
Basement	Full, conc. floor	Full, conc. floor	Full, conc. floor	Full, conc. floor	⅔, conc. floor	½, conc. floor	Full, conc. floor
Walls	Frame & stucco	Frame siding	Frame siding	Frame siding	Frame, stone-tone, stu.	Frame stucco	Frame stucco
Roof	Hip, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles
Attic	None	Finished, 2 rms.	None	None	Unfinished	Unfinished	3 rms. finished
Projections	2 porches	1 nook	1 small porch	2 dormers	2 bays	3 dormers, nook	4 dorm., 2 bays 2 porches
Interior finish	Fir, plastered 2 rms. H. W. floor	Fir, plastered 3 rooms	Fir, plastered pap., H. W. floors	Fir, plastered 2 rms. H. W. floor	Fir, plastered 2 set fr. drs. 4 rms. H. W. floor	Fir, plastered pap., 5 rms. H. W. floor	Fir, plastered, pap., all rms. H. W. floor
Built-in features	Bk., cabinets	Bk., Bu., cabinets	Bk., Bu., cabinets	Bk., Bu., cabinets	M., C., Bk., K.	M., Bk., Bu., cabinets	M., Bk., Bu., cabinets
Plumbing	S. B. T. W. L.	S. B., 2 T., 2 W. L.	S. B., 2 T., 2 W. L.	S. B. T. W. L.	S. B. T. W. L.	S. B. T. W. L.	S. 2 B., 2 T., 2 W. L. tile fl.
Heating	H. A. pipeless, F.	H. A., F.	H. A., F.	H. A., F.	H. A., F.	H. A., F.	H. W., steam
Authors' remarks	.....	.....	2-stories Colonial type	2-stories, Dutch Colonial type	English type	1½-story English type	2-stories, country home type

NOTE.—Cubic foot costs computed by authors.

NOTE.—Deduct 20¢ per 50 sq. ft. additional area for building having a greater floor area than this standard. Add 20¢ for similar deduction. 1930 costs 6 to 10 per cent lower.

TABLE 30.—PORTLAND, ORE., PHYSICAL DEPRECIATION OF BUILDINGS
Per Cent

Age, years	Std. steel	Reinforced concrete		Brick			Frame		
	Good	Good	Fair	Good	Fair	Poor	Good	Fair	Poor
1	1.5	1.5	1.8	1.8	2.0	2.4	2.0	2.4	3.0
2	3.0	3.0	3.6	3.6	4.0	4.8	4.0	4.8	6.0
3	4.5	4.5	5.4	5.4	6.0	7.2	6.0	7.2	9.0
4	6.0	6.0	7.2	7.2	8.0	9.6	8.0	9.6	12.0
5	7.5	7.5	9.0	9.0	10.0	12.0	10.0	12.0	15.0
6	9.0	9.0	10.8	10.8	12.0	14.4	12.0	14.4	18.0
7	10.5	10.5	12.6	12.6	14.0	16.8	14.0	16.8	21.0
8	12.0	12.0	14.4	14.4	16.0	19.2	16.0	19.2	24.0
9	13.5	13.5	16.2	16.2	18.0	21.6	18.0	21.6	27.0
10	15.0	15.0	18.0	18.0	20.0	24.0	20.0	24.0	30.0
11	16.5	16.5	19.8	19.8	22.0	26.4	22.0	26.4	33.0
12	18.0	18.0	21.6	21.6	24.0	28.8	24.0	28.8	36.0
13	19.5	19.5	23.4	23.4	26.0	31.2	26.0	31.2	39.0
14	21.0	21.0	25.2	25.2	28.0	33.6	28.0	33.6	42.0
15	22.5	22.5	27.0	27.0	30.0	36.0	30.0	36.0	45.0
20	30.0	30.0	36.0	36.0	40.0	48.0	40.0	48.0	60.0
25	37.5	37.5	45.0	45.0	50.0	60.0	50.0	60.0	75.0
30	45.0	45.0	54.0	54.0	60.0	72.0	60.0	72.0	90.0
35	52.5	52.5	63.0	63.0	70.0	84.0	70.0	84.0	
40	60.0	60.0	72.0	72.0	80.0	90.0	80.0	90.0	
45	67.5	67.5	81.0	81.0	90.0	....	90.0		
50	75.0	75.0	90.0	90.0					
55	82.5	82.5							
60	90.0	90.0							

NOTE.—This table is based (1) upon the character of construction; (2) upon the average existence of the structure as a whole, taking into consideration the relative cost of its various materials, the limit of life of its most durable part and obsolescence.

FIG. 22.—Denver single residence, brick E.
NOTE.—See Table 24.

FIG. 23.—Denver single residence, brick H.
NOTE.—See Table 24.

TABLE 30.—PORTLAND, ORE., PHYSICAL DEPRECIATION OF BUILDINGS
Per Cent

Age, years	Std. steel	Reinforced concrete		Brick			Frame		
	Good	Good	Fair	Good	Fair	Poor	Good	Fair	Poor
1	1.5	1.5	1.8	1.8	2.0	2.4	2.0	2.4	3.0
2	3.0	3.0	3.6	3.6	4.0	4.8	4.0	4.8	6.0
3	4.5	4.5	5.4	5.4	6.0	7.2	6.0	7.2	9.0
4	6.0	6.0	7.2	7.2	8.0	9.6	8.0	9.6	12.0
5	7.5	7.5	9.0	9.0	10.0	12.0	10.0	12.0	15.0
6	9.0	9.0	10.8	10.8	12.0	14.4	12.0	14.4	18.0
7	10.5	10.5	12.6	12.6	14.0	16.8	14.0	16.8	21.0
8	12.0	12.0	14.4	14.4	16.0	19.2	16.0	19.2	24.0
9	13.5	13.5	16.2	16.2	18.0	21.6	18.0	21.6	27.0
10	15.0	15.0	18.0	18.0	20.0	24.0	20.0	24.0	30.0
11	16.5	16.5	19.8	19.8	22.0	26.4	22.0	26.4	33.0
12	18.0	18.0	21.6	21.6	24.0	28.8	24.0	28.8	36.0
13	19.5	19.5	23.4	23.4	26.0	31.2	26.0	31.2	39.0
14	21.0	21.0	25.2	25.2	28.0	33.6	28.0	33.6	42.0
15	22.5	22.5	27.0	27.0	30.0	36.0	30.0	36.0	45.0
20	30.0	30.0	36.0	36.0	40.0	48.0	40.0	48.0	60.0
25	37.5	37.5	45.0	45.0	50.0	60.0	50.0	60.0	75.0
30	45.0	45.0	54.0	54.0	60.0	72.0	60.0	72.0	90.0
35	52.5	52.5	63.0	63.0	70.0	84.0	70.0	84.0	
40	60.0	60.0	72.0	72.0	80.0	90.0	80.0	90.0	
45	67.5	67.5	81.0	81.0	90.0	....	90.0		
50	75.0	75.0	90.0	90.0					
55	82.5	82.5							
60	90.0	90.0							

NOTE.—This table is based (1) upon the character of construction; (2) upon the average existence of the structure as a whole, taking into consideration the relative cost of its various materials, the limit of life of its most durable part and obsolescence.

FIG. 22.—Denver single residence, brick E.
NOTE.—See Table 24.

FIG. 23.—Denver single residence, brick H.
NOTE.—See Table 24.

TABLE 31.—PORTLAND ORE., LIFE AND PHYSICAL DEPRECIATION OF BUILDINGS

Per Cent

Life, years	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	20	25	30	35	40	45	50
Frame, poor const.	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	60	75	90				
" aver. "	2.4	4.8	7.2	9.6	12.0	14.4	16.8	19.2	21.6	24	26.4	28.8	31.2	33.6	36.0	48.0	60	72	84	90		
" good "	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	40	50	60	70	80	90	
Brick, poor "	2.4	4.8	7.2	9.6	12	14.4	16.8	19.2	21.6	24	26.4	28.8	31.2	33.6	36.0	48.0	60	72	84	90		
" aver. "	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	40	50	60	70	80	90	
" good "	1.8	3.6	5.4	7.2	9.0	10.8	12.6	14.4	16.2	18.0	19.8	21.6	23.4	25.2	27.0	36	45	54	63	72	81	90

TABLE 32.—ST. PAUL (1930)—SINGLE RESIDENCES

Class	Description	Cost cu. ft., cents						
		Solid stone	Pressed brick, stone trim	Stucco on brick, tile or conc. blocks, brick trim	Face brick veneer on frame	Brick and stucco combination on frame	Stucco on frame	Frame
A	Full basement, cement floors, ldry., hot water heat, modern plumbing, gas, electricity, 2 or more tiled baths, beamed ceilings, panelled wainscot, fine mantels, bookcases, tiled roof, sleeping porches. This is the highest class dwelling with every improvement and all materials of the best quality	55 to 70	48 to 65	45 to 63	44 to 62	43 to 60	42 to 52	40 to 50
B	Same general description as Class A, but inferior finish, less perfect, is complete with every modern convenience, good quality throughout, a high-class modern residence	45 to 60	43 to 55	40 to 48	38 to 46	36 to 45	33 to 43	30 to 40
C	Full basement, cement floors, ldry., hot water or furnace heat, modern plumbing, 1 bath., electricity and gas, some built-in features, fireplace, hardwood floors, and finish. This is the ordinary home of good quality	38 to 45	35 to 40	30 to 38	25 to 32	24 to 30	23 to 28	22 to 27
D	Full basement, ldry., furnace heat, 1 bath., wood finish, no fireplace, plain trim, fairly well finished but substantial	.....	.....	23 to 25	23 to 28	22 to 24	20 to 22	19 to 21
E	Part basement, no ldry., furnace heat, old style plumbing, 1 bath., wood finish, painted woodwork, cheap construction, and everything plain	.....	.....	.....	.....	.....	14 to 19	13 to 18
F	Post foundation, part basement, no bath, stove heat, no improvements, everything inferior quality	.....	.....	.....	.....	.....	9 to 11	8 to 10

NOTE.—Costs were prepared for the St. Paul assessor by a committee from the Builders Exchange.

TABLE 33.—ST. PAUL LIFE AND PHYSICAL DEPRECIATION OF BUILDINGS

Type of residence	Life, years	Ann. phys. dep., per cent		
		Poor	Aver.	Good
Stone, brick, stucco. On brick, tile or concrete blocks	55 to 70	1½	2	3
Brick veneer on frame, brick and stucco on frame, stucco on frame	50 to 60	1¾	2½	1½
Frame, good construction	45 to 55	2	3	4
" poor "	30 to 40	2	3	4

TABLE 34.—GRAND RAPIDS (1927)—SINGLE RESIDENCES[1]

No.	Description	Cost cu. ft., cents		
		Frame	Brick veneer on frame	Brick veneer on tile
1	Full basement, 6 rooms, H. A. heat, electricity, bath, 8′ × 16′ porch, 24′ × 24′ outside dimensions, 28′ height, oak floor in living rm. and dining rm., rest pine floors, pine finish	22	32	35
2	Same as No. 1 with hardwood finish throughout	23	33	36
3	Same as No. 1 with 2 baths	23	36	33
4	" " No. 2 " " "	24	34	37
5	" " No. 1 " ordinary fireplace	26	36	39
6	Same as No. 2 with fireplace	27	37	40
7	" " No. 1 " H. W. heat	26	36	39
8	" " No. 1 " Steam "	28	38	41

[1] John Buys in *Nat. Real Estate Jour.*

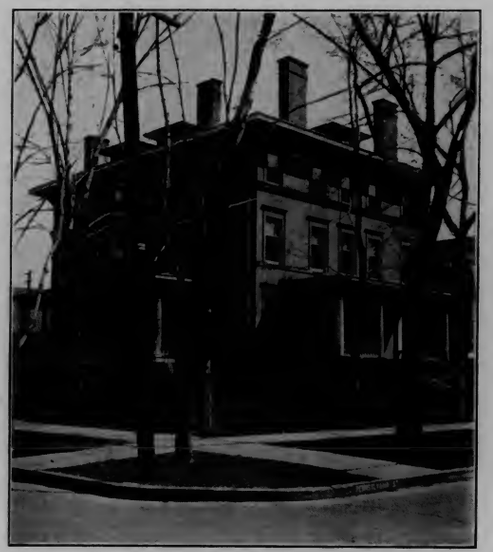


FIG. 24.—Denver single residence, brick J.
NOTE.—See Table 24.

FIG. 25.—Denver single residence, stone A.
NOTE.—See Table 24.

TABLE 33.—ST. PAUL LIFE AND PHYSICAL DEPRECIATION OF BUILDINGS

Type of residence	Life, years	Ann. phys. dep., per cent		
		Poor	Aver.	Good
Stone, brick, stucco. On brick, tile or concrete blocks	55 to 70	1½	2	3
Brick veneer on frame, brick and stucco on frame, stucco on frame	50 to 60	1¾	2½	1½
Frame, good construction	45 to 55	2	3	4
" poor "	30 to 40	2	3	4

TABLE 34.—GRAND RAPIDS (1927)—SINGLE RESIDENCES[1]

No.	Description	Cost cu. ft., cents		
		Frame	Brick veneer on frame	Brick veneer on tile
1	Full basement, 6 rooms, H. A. heat, electricity, bath, 8′ × 16′ porch, 24′ × 24′ outside dimensions, 28′ height, oak floor in living rm. and dining rm., rest pine floors, pine finish	22	32	35
2	Same as No. 1 with hardwood finish throughout	23	33	36
3	Same as No. 1 with 2 baths	23	36	33
4	" " No. 2 " " "	24	34	37
5	" " No. 1 " ordinary fireplace	26	36	39
6	Same as No. 2 with fireplace	27	37	40
7	" " No. 1 " H. W. heat	26	36	39
8	" " No. 1 " Steam "	28	38	41

[1] John Buys in *Nat. Real Estate Jour.*

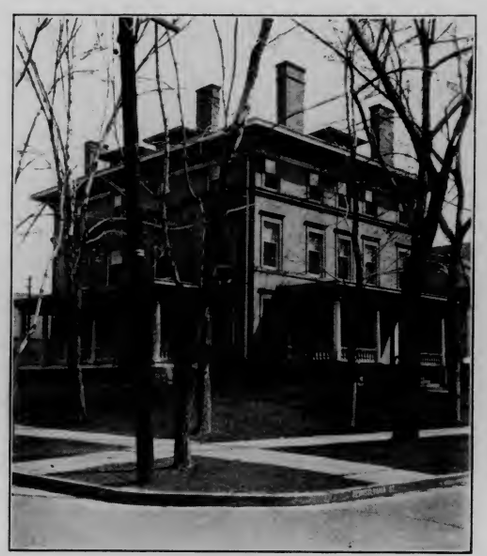


FIG. 24.—Denver single residence, brick J.
NOTE.—See Table 24.

FIG. 25.—Denver single residence, stone A.
NOTE.—See Table 24.

TABLE 35.—CHICAGO (1927)—SINGLE RESIDENCES[1]

Frame	Cost cu. ft., cents
Poor const. These are small houses cheaply built of poor material, cheap heating plant	24
Aver. const. Hot air heat, good material and workmanship, good fixtures and heating plant	26 to 27
Good const. Steam or hot water heat, best of construction throughout	27 to 30
Stucco	
Poor const. These are small houses, cheaply built of poor material, cheap heating plant	26
Average const. Hot air heat, good material and workmanship, good fixtures, good heating plant	27 to 28
Good const. Steam or hot water heat, best of construction throughout	29 to 31
Brick	
Poor const. These are small houses cheaply built with poor material and cheap heating plant	27
Average const. Hot air heat, good material and careful labor, good fixtures, good heating plant	28 to 29
Good const. Steam or hot water heat, best of construction throughout	29 to 31

[1] Gordon, Strong & Co.

Detroit (Assessors Office, 1930).—Table 36 shows figures which are used for the purpose of issuing building permits and represents the cost exclusive of architects fees but includes contractors profits. The cost does not include any decorations, expensive stone ornamentation, marble work, heating, or ventilating systems of unusual or complicated design, special apparatus or equipment of any sort, such as refrigerating apparatus, compressed air piping, etc., or any financing cost.

TABLE 36.—DETROIT (1930)—RESIDENCE

Description	Cost cu. ft., cents
Frame	19 to 26
Stucco	21 to 27
Brick veneer	24 to 35
" or stone	28 to 42

Engineering News-Record (1928).—The *Engineering News-Record* issue of March, 1928, gives the following table of current square foot costs of different types of buildings:

TABLE 37.—COST OF BUILDINGS

Description	Cost sq. ft.
Banks	$18.80
Theatres	10.40
Hospitals	8.30
Hotels	8.20
Public	8.00
Office	7.85
Industrial	6.90
Schools	6.25
Dwellings	4.90
Apartments	4.75
Average all buildings	6.70

The average cost of single residences in New York City May 1, 1929, as compiled by Allen E. Beals, vice president of The Dow Service Daily Building Reports, New York, is given in Table 38.

TABLE 38.—NEW YORK CITY (1929)—SINGLE RESIDENCES

Description	Cost cu. ft., cents
2½ story, speculative-group const., frame	34
2½ " " " " brick	42
2½ " " " " stucco	40
1½ " " " " "	32
1 " 4–5 rm. bungalow, frame at seashore	30
2½ " 1 family, detached, private, brick and wood	47
2½ " " " " " stucco on brick	47
1½ " " " " " frame	39
3 " mansion type, 20 rms., fireproof, private, steel and stone	84
3 " mansion type, 13 rms., semi-fireproof, private, brick and wood	66
3 " mansion type, 13 rms., semi-fireproof, private, frame	55
2½ " mansion type, semi-fireproof, private, frame	55
2½ " mansion type, all equipped, semi-fireproof private, brick and stone	65
2½ " mansion type, all equipped, semi-fireproof, stucco and wood	55

NOTE.—These prices do not include the cost of financing, demolition of structures that may be on the site, test borings, surveys, or contractors profit, which average about 2½%.

Grace and Bernieri, San Francisco (1925), report the cost of cheaply constructed residences at $3.50 to $6.00 per sq. ft. and well-constructed residences at $5.25 to $8.00 per sq. ft.

Milwaukee (1926) small cottages, 1½ story and basement, cost 22 to 30¢. Farm residences and large homes cost 35 to 40¢. Veneered 2-story residences cost 40 to 45¢.

TABLE 39.—BOSTON (1927)—SINGLE RESIDENCES[1]

No.	Description	Cost	
		Sq. ft.	Cu. ft.
1	2½- and 3-story frame houses for 1, 2, or 3 families, with attic and improvements.	$12.40 to 13.33	$0.40 to 0.43
2	3-story brick houses for 3 families with improvements	15.84	0.44
3	3-story brick residence, 1 family, with improvements	17.64	0.49

[1] Boston Real Estate Exchange.

TABLE 40.—MINNEAPOLIS (1927)—SINGLE RESIDENCES

Description	Cost cu. ft., cents
Residences, costing $20,000 to $30,000	40 to 60
" " 15,000 to 20,000	35 to 40
" " 10,000 to 15,000	30 to 35
" " 5,000 to 10,000	26 to 30
" " 3,000 to 5,000	24 to 26

TABLE 41.—LOS ANGELES (1930)—FRAME BUILDINGS

Type	Cost sq. ft.						
	Poor	Aver.	Aver. plus	Good	Good plus	Special	Extra
Mavericks	$0.75	.....	.....	$1.00			
California houses	0.75	.....	.....	1.10			
Cottages	1.00	$1.25	.....	1.50			
Dwellings	1.50	1.75	.....	2.25			
Residences	1.75	2.00	$2.25	2.50	$2.75	$3.00 up	
Bungalows	1.40	1.60	1.80	2.00	2.25	2.50	$2.75 up

Cincinnati System (1930).—The Cincinnati system was devised by engineers from the University of Cincinnati, and differs from all other systems reviewed, in that 80 per cent reproduction cost value of the building was secured by adding certain index factors which are listed as follows:

1. Tax value unit, $3.55 per sq. ft. on first floor area, 1-story residence.
2. Tax value unit, $4.40 per sq. ft. of first floor area, 1½-story residence.

1-A. Tax value unit, $4.50 per sq. ft. of first floor area, 1-story residence elaborate design.

2-A. Tax value unit, $5.75 per sq. ft., for first floor area, 1½-story residence, elaborate design.

3. Tax value unit, $5.30 per sq. ft., of first floor area, 2-story residence.

3-A. Tax value unit, $7 per sq. ft., of first floor area, 2-story residence, elaborate design.

TABLE 42.—CINCINNATI SINGLE RESIDENCES

Item	Index
INDEX TABLE, CLASS 1, 2, 1-A, 2-A	
1. Foundation	
Stone	19.0
Concrete	12.0
2. Basement	
Excavation, 100%	4.0
Cement floor, 100%	5.0
5. Material, walls	
Siding	15.0
Lap-drop	18.0
Shingle	20.0
Stucco	18.0
" on frame	28.0
" " brick	38.0
Brick, common	30.0
" face, 100%	36.0
Stone, 100%	56.0
Concrete	
Terra cotta	
6. Roof, type	
Flat	5.0
Hip	13.0
Gable	8.0
Mansard	16.0
Material	
Slate	19.0
Shingle	14.0
Tile	30.0
Metal	11.0
Composition	8.0
Concrete	
8. Porch	
Wood	1.0
Concrete and wood	1.5
" " brick	1.5
9. Inside finish	
Hardwood, 100%	49.0
Pine	30.0
Floors	
Hardwood, 100%	22.0
Pine	14.0
10. Attic	
Finished	2.0
Unfinished	0.0
Number of rooms	5.0

TABLE 42.—CINCINNATI SINGLE RESIDENCES.—(*Continued*)

Item	Index
INDEX TABLE, CLASS 1, 2, 1-A, 2-A	
11. Improvements	
Sewer	0.5
Water	0.3
Gas	0.2
CLASS 3 AND CLASS 3-A	
1. Foundation	
Stone	14.0
Concrete	9.0
2. Basement	
Excavation, 100%	3.0
Cement floor	4.0
5. Material, walls	
Siding	22.0
Lap-drop	25.0
Shingle	28.0
Stucco	25.0
" on frame	36.0
" " brick	45.0
Brick, common	35.0
" face 100%	42.0
Stone, 100%	66.0
Concrete	
Terra cotta	
6. Roof, type	
Flat	4.0
Hip	10.0
Gable	6.0
Mansard	14.0
Material	
Slate	14.0
Shingle	10.0
Tile	25.0
Metal	8.0
Composition	6.0
Concrete	
8. Porch	
Wood	1.0
Concrete and wood	1.5
" " brick	2.5
9. Inside finish	
Hardwood, 100%	53.0
Pine	32.0
Floors	
Hardwood, 100%	22.0
Pine	14.0

TABLE 42.—CINCINNATI SINGLE RESIDENCES.—(*Continued*)

Item	Index
CLASS 3 AND CLASS 3-A	
10. Attic	
Finished	2.0
Unfinished	0.0
Number of rooms	5.0
11. Improvements	
Sewer	0.5
Water	0.3
Gas	0.2

NOTE.—Add two-thirds of the area of all one-story projections to the first floor area.

Example.—A one-story residence Class 1-A having a tax value unit of $4.50 per sq. ft. of floor area would be described and indexed as follows:

Item	Per cent
1. Foundation, concrete	12.0
2. Basement, 100% excavated	4.0
3. Basement, concrete floor	5.0
4. Materials, walls, common brick	30.0
5. Roof type, gable	8.0
6. Roof material, shingle	14.0
7. Porch, wood	1.0
8. Inside finish, pine	30.0
9. Floors, pine	14.0
10. Attic, unfinished	0.0
11. Improvements, sewer and water	0.
Total	118.8
118.8% × $4.50 = $5.346	
Area = 1,190 sq. ft.	
1,190 × $5.346 = $6,361	
Extras	
Modern light fixtures	$100
Toilet	50
Bath, plain	150
5 rooms hot air *a* $20	100
Kitchen cabinet	100
Bookcase	50
1-car brick garage	420
Total value	$7.331

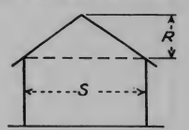
TABLE 43.—AVERAGE HEIGHT OF RESIDENCES

Description	Feet
First floor to bottom of footings, no basement	2.0
" " " basement floor	8.0
" " " intersection of outer wall with gable roof line, new buildings	10.0
First floor to bottom for ½ basement	4.0
" " " second floor, new building	9.0
" " " " " old "	10.0
Second floor to intersection of outer wall with gable line	9.0
For 24 ft. width house, ¼ pitch, vertical distance between intersection outer wall with gable roof line, and point midway to ridge of roof	3.0
For 24 ft. width of house, ½ pitch, vertical distance between intersection outer wall with gable roof line and point midway to ridge of roof	6.0
For 24 ft. width house, ⅓ pitch, vertical distance between intersection outer wall with gable roof line and point midway to ridge of roof	4.0

NOTE.—The pitch of a roof is the rise divided by the span, or

$$P = \frac{R}{S}$$

where P = pitch, R = rise, S = span, as shown below.



Pitch of roof.

FIG. 26.—Denver double residence, brick A.
NOTE.—See Table 44.

FIG. 27.—Denver double residence, brick C.
NOTE.—See Table 44.

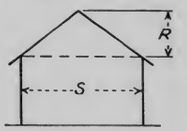
TABLE 43.—AVERAGE HEIGHT OF RESIDENCES

Description	Feet
First floor to bottom of footings, no basement	2.0
" " " basement floor	8.0
" " " intersection of outer wall with gable roof line, new buildings	10.0
First floor to bottom for ½ basement	4.0
" " " second floor, new building	9.0
" " " " " old "	10.0
Second floor to intersection of outer wall with gable line	9.0
For 24 ft. width house, ¼ pitch, vertical distance between intersection outer wall with gable roof line, and point midway to ridge of roof	3.0
For 24 ft. width of house, ½ pitch, vertical distance between intersection outer wall with gable roof line and point midway to ridge of roof	6.0
For 24 ft. width house, ⅓ pitch, vertical distance between intersection outer wall with gable roof line and point midway to ridge of roof	4.0

NOTE.—The pitch of a roof is the rise divided by the span, or

$$P = \frac{R}{S}$$

where P = pitch, R = rise, S = span, as shown below.



Pitch of roof.

FIG. 26.—Denver double residence, brick A.
NOTE.—See Table 44.

FIG. 27.—Denver double residence, brick C.
NOTE.—See Table 44.

TABLE 44.—DENVER (1930)—DOUBLE RESIDENCES
Classification No. 2

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement, finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Frame A	16	18	20	25	30	40	4.0	3.3	2.5	1	½	Conc.	None	Brick or conc.
Brick A	18	20	22	35	40	45	2.9	2.5	2.2	"	"	"	"	"
" B	21	23	25	40	50	55	2.5	2.0	1.8	"	"	"	"	"
" C	20	22	24	50	55	65	2.0	1.8	1.5	"	Full	"	"	"
" D	22	24	26	40	50	55	2.5	2.0	1.8	2	½	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Frame A	Siding out, plaster in	Small	Gable, shingle	Soft	Stove	S. B. T.	K.	Non-fire resisting
Brick A	Brick out, plaster in	"	Flat T. & G.	"	"	"	"	"
" B	"	Medium wooden	"	"	H. A.	S. B. T. W.	K. Lin. M. F.	"
" C	"	Large brick	Gable, shingle	Hard	"	S. B. T. W. L.	K. Lin. M. F. B. K.	"
" D	"	Medium	Flat T. & G.	Soft	"	S. B. T. W.	K. M. F.	"

NOTE.—Where the standard classification for frame double residences calls for ½ basement, deduct 3¢ per cu. ft. for full basement.
Where the standard classification for brick double residences calls for full basement, add 3¢ per cu. ft. for ½ basement.
Where the standard classification for brick double residences calls for ½ basement, deduct 3¢ per cu. ft. for full basement.

TABLE 45.—CLEVELAND (1930)—DOUBLE RESIDENCES[1]

	Class 1	Class 2	Class 3	Class 4
Stories	2	2	2	2
Frame, sq. ft	$5.40	$6.80	$9.00	
" cu. ft	0.18	0.22½	0.30	
Brick, sq. ft	6.00	7.50	9.90	$10.50
" cu. ft	0.20	0.25	0.33	0.35
Walls	Lap siding	Lap siding	Press brick or lap siding	1 story, brick 2 story, siding, stucco or shingles
Basement	Full	Full	Full	Full
Roof	Gable, wood shingles	Gable, wood shingles	Gable, slate	Gable, gambrel slate
Attic	Unfinished	Unfinished	Plastered, no partition	2 rooms. 2 baths
Projections	Porch	4 bays, 2 dormers, porch	4 bays, 2 dormers, 10-ft. porch	Nooks, porches, dormers
Interior finish	Pine, no built-in fixtures, pine floors	H. W. & white enamel finish, H. W. floors	H. W. & white enamel finish, tile B., built-in features, 2 M. & F.	H. W. & white enamel tile B., built-in features M. & F.
Plumbing	B. T. S. W. each suite	B. T. S. W. each suite	B. T. S. W. L. each suite	2 B., 2 T., 2 W., S.L. each suite
Heating	2 H. A.	2 H. A.	2 H. W. steam or vapor	2 H. W. steam or vapor
Area	1,000 sq. ft.	1,200 sq. ft.	1,400 sq. ft.	1,400 sq. ft.

[1] From Zangerle's "Principles of Real Estate Appraising."

NOTE.—Deduct 20¢ per sq. ft. for 50 sq. ft. additional area and add 20¢ per sq. ft. for 50 sq. ft. deduction in area. For physical depreciation Table 26.

TABLE 46.—ROCHESTER (1930)—DOUBLE RESIDENCES

	Class 4-A	Class 4-B		Class 4-C		Class 4-D	
Stories	2	2	2½	2	2½	2	2½
Frame, shingle & 6" siding, sq. ft.	$5.00	$6.00	$6.72	$9.00	$10.08	$12.00	$13.44
" " " " cu. ft.	0.16½	0.20	0.21	0.30	0.31½	0.40	0.42
" " " 8" & 10" siding, sq. ft.		6.12	6.85	9.18	10.28	12.24	13.71
" " " " cu. ft.		0.20½	0.21½	0.30½	0.32	0.41	0.43
" plaster or stucco, sq. ft.		6.24	6.99	9.36	10.48	12.48	13.98
" " " " cu. ft.		0.21	0.22	0.31	0.33	0.41½	0.43½
Brick veneer or common brick, sq. ft.		.....	.....	.....	.....	13.20	14.78
" " " " cu. ft.	5.75	.....	.....	.....	.....	0.44	0.46
Tile or block with plaster or stucco, sq. ft.	0.19	.....	.....	.....	.....	13.08	14.65
" " " " " " cu. ft.		.....	.....	.....	.....	0.43½	0.45½
" " " brick veneer, sq. ft.		.....	.....	.....	.....	13.80	15.46
" " " " " cu. ft.		.....	.....	.....	.....	0.46	0.48½
Walls	As described	As described		As described		As described	
Basement	Full conc. floor	Full conc. floor		Full conc. floor		Full conc. floor	
Roof	Gable, wood shingles	Gable, wood shingles		Gable, gambrel, wood shingles		Gable, tile	
Attic	Unfinished	Unfinished		Unfinished		Unfinished	
Interior finish	Pine	Hardwood or gum		Hardwood or gum		Hardwood or gum	
Floors	Pine	Oak		Oak		Oak	
Plumbing	B. S. T. W. L., H. W. boiler each suite	B. S. T. W. L., H. W. boiler each suite		B. S. T. W. L., H. W. boiler each suite		B. S. T. W. L., automatic heater, tile B. each suite	
Heating	2 H. A.	2 H. A.		2 H. A.		2 H. W. steam or vapor	
Authors' remarks	Cheap const., few closets, no built-in features, old type	Simple good const., modern type		Moderately high-grade const., well fitted & finished. May have tile B., vestibule & built-in tub. Brick faced foundation		High-grade trim & finish, good const., refined architectural details	

FIG. 28.—Denver double residence, brick D.
NOTE.—See Table 44.

TABLE 47.—PORTLAND ORE. (1926)—DOUBLE RESIDENCES

	Class 1	Class 2	Class 3
Stories	1	1½	2
Cost, sq. ft.	$3.60	$5.00	$7.30
Cost, cu. ft.	0.19	0.25	0.24
Standard area	.....	1,260 sq. ft.	1,298 sq. ft.
Number rooms	5 each suite	6 each suite	6 each suite
Construction	Good	Good	Good
Foundation	Conc.	Conc.	Conc.
Basement	Full conc. floors	⅔ conc. floors	Full conc. floors
Walls	Frame stucco	Frame siding	Frame stucco
Roof	Hip, wood shingles	Gable, wood shingles	Gambrel, hip, wood shingles
Attic	Unfinished	Fin. 4 rooms	Unfinished
Projections	Small porches	2 dormers 2 porches	1 dormer
Interior finish	Fir, enameled H. W. floors	Fir, enameled H. W. floors	Fir, plastered, papered ½, H. W. floor, tile B.
Built-in features	M., Bk., Bu., cabinet	M., Bk., Bu., cabinet	Bk., Bu., K.
Plumbing	S. B. T. W. L. each suite	S. B. T. W. L. each suite	S. B. T. W. L. each suite
Heating	H. A. F.	Gas furnace, F.	H. A. F.

NOTE.—Cubic foot cost computed by authors.
For Class 2, deduct 20¢ per 50 sq. ft. additional area for buildings having a greater floor area than standard. Add 20¢ for similar deduction. For Class 3 add or deduct 15¢ per 50 sq. ft.
For 1930 deduct 6 to 10 %.
For life and physical depreciation Table 30.

TABLE 46.—ROCHESTER (1930)—DOUBLE RESIDENCES

	Class 4-A	Class 4-B		Class 4-C		Class 4-D	
Stories	2	2	2½	2	2½	2	2½
Frame, shingle & 6" siding, sq. ft.	$5.00	$6.00	$6.72	$9.00	$10.08	$12.00	$13.44
" " " " cu. ft.	0.16½	0.20	0.21	0.30	0.31½	0.40	0.42
" " " 8" & 10" siding, sq. ft.		6.12	6.85	9.18	10.28	12.24	13.71
" " " " cu. ft.		0.20½	0.21½	0.30½	0.32	0.41	0.43
" plaster or stucco, sq. ft.		6.24	6.99	9.36	10.48	12.48	13.98
" " " " cu. ft.		0.21	0.22	0.31	0.33	0.41½	0.43½
Brick veneer or common brick, sq. ft.	5.75	.....	.....	.....	.....	13.20	14.78
" " " " cu. ft.	0.19	.....	.....	.....	.....	0.44	0.46
Tile or block with plaster or stucco, sq. ft.		.....	.....	.....	.....	13.08	14.65
" " " " " cu. ft.		.....	.....	.....	.....	0.43½	0.45½
" " " brick veneer, sq. ft.		.....	.....	.....	.....	13.80	15.46
" " " " " cu. ft.		.....	.....	.....	.....	0.46	0.48½
Walls	As described	As described		As described		As described	
Basement	Full conc. floor	Full conc. floor		Full conc. floor		Full conc. floor	
Roof	Gable, wood shingles	Gable, wood shingles		Gable, gambrel, wood shingles		Gable, tile	
Attic	Unfinished	Unfinished		Unfinished		Unfinished	
Interior finish	Pine	Hardwood or gum		Hardwood or gum		Hardwood or gum	
Floors	Pine	Oak		Oak		Oak	
Plumbing	B. S. T. W. L., H. W. boiler each suite	B. S. T. W. L., H. W boiler each suite		B. S. T. W. L., H. W. boiler each suite		B. S. T. W. L., automatic heater, tile B. each suite	
Heating	2 H. A.	2 H. A.		2 H. A.		2 H. W. steam or vapor	
Authors' remarks	Cheap const., few closets, no built-in features, old type	Simple good const., modern type		Moderately high-grade const., well fitted & finished. May have tile B., vestibule & built-in tub. Brick faced foundation		High-grade trim & finish, good const., refined architectural details	

FIG. 28.—Denver double residence, brick D.

NOTE.—See Table 44.

TABLE 47.—PORTLAND ORE. (1926)—DOUBLE RESIDENCES

	Class 1	Class 2	Class 3
Stories	1	1½	2
Cost, sq. ft.	$3.60	$5.00	$7.30
Cost, cu. ft.	0.19	0.25	0.24
Standard area	.....	1,260 sq. ft.	1,298 sq. ft.
Number rooms	5 each suite	6 each suite	6 each suite
Construction	Good	Good	Good
Foundation	Conc.	Conc.	Conc.
Basement	Full conc. floors	⅔ conc. floors	Full conc. floors
Walls	Frame stucco	Frame siding	Frame stucco
Roof	Hip, wood shingles	Gable, wood shingles	Gambrel, hip, wood shingles
Attic	Unfinished	Fin. 4 rooms	Unfinished
Projections	Small porches	2 dormers 2 porches	1 dormer
Interior finish	Fir, enameled H. W. floors	Fir, enameled H. W. floors	Fir, plastered, papered ½, H. W. floor, tile B.
Built-in features	M., Bk., Bu., cabinet	M., Bk., Bu., cabinet	Bk., Bu., K.
Plumbing	S. B. T. W. L. each suite	S. B. T. W. L. each suite	S. B. T. W. L. each suite
Heating	H. A. F.	Gas furnace, F.	H. A. F.

NOTE.—Cubic foot cost computed by authors.

For Class 2, deduct 20¢ per 50 sq. ft. additional area for buildings having a greater floor area than standard. Add 20¢ for similar deduction. For Class 3 add or deduct 15¢ per 50 sq. ft.

For 1930 deduct 6 to 10 %.

For life and physical depreciation Table 30.

TABLE 48.—DENVER (1930)—TWO-FAMILY AND DUPLEX RESIDENCES

Classification No. 3

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Frame A	20	22	24	25	30	40	4.0	3.3	2.5	2	½	Conc.	None	Brick or conc.
Brick A	24	26	28	40	50	55	2.5	2.0	1.8	2	½	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Frame A	Siding out, plaster in	Large	Gable, shingle	Soft	Stove	S. B. T. each floor	None	Non-fire resisting
Brick A	Brick out, plaster in	"	"	"	Steam or H. W.	S. B. T. W. each floor	K. each floor	"

FIG. 29.—Denver two-family residence, frame A.
NOTE.—See Table 48.

FIG. 30.—Denver two-family residence, brick A.
NOTE.—See Table 48.

TABLE 48.—DENVER (1930)—TWO-FAMILY AND DUPLEX RESIDENCES
Classification No. 3

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Frame A	20	22	24	25	30	40	4.0	3.3	2.5	2	½	Conc.	None	Brick or conc.
Brick A	24	26	28	40	50	55	2.5	2.0	1.8	2	½	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Frame A	Siding out, plaster in	Large	Gable, shingle	Soft	Stove	S. B. T. each floor	None	Non-fire resisting
Brick A	Brick out, plaster in	"	"	"	Steam or H. W.	S. B. T. W. each floor	K. each floor	"

FIG. 29.—Denver two-family residence, frame A.
NOTE.—See Table 48.

FIG. 30.—Denver two-family residence, brick A.
NOTE.—See Table 48.

Many cities use the same cost per cubic foot for both single and double residences.

TABLE 49.—CLEVELAND (1930)—TWO-FAMILY AND DUPLEX RESIDENCES

	Class 1	Class 2	Class 3	Class 4
Stories	2	2	2	2
Frame, sq. ft.	$4.50	$5.40	$6.00	$7.20
" cu. ft.	0.15	0.18	0.20	0.24
Brick, sq. ft.	5.00	6.00	6.60	7.90
" cu. ft.	0.17	0.20	0.22	0.26
Walls	Drop siding	Lap siding	Narrow siding	Optional
Basement	Full	Full	Full	Full
Roof	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, slate
Attic	Unfinished	Unfinished	Unfinished	Unfinished
Projections	Porch	Porch	Bay window, porch	Dormers, bay window, porch
Interior finish	Pine, pine floors	Pine, pine floors	H. W. & white enam. H. W. floors	H. W. & white enam. tile B.
Plumbing	B. T. W. S. each suite	B. T. W. S. L. each suite	B. T. S. W. L. each suite	2 T. 2 W. B. S. L. per suite
Heating	Stove	H. A.	H. A.	H. W. steam or vapor
Area	900 sq. ft.	1,000 sq. ft.	1,000 sq. ft.	1,000 to 1,300 sq. ft.

From Zangerle's "Principles of Real Estate Appraising."
NOTE.—Cubic foot costs computed by authors.
Deduct 20¢ per sq. ft. additional area. Add 20¢ for similar deduction.

TABLE 50.—ROCHESTER (1930)—TWO-FAMILY AND DUPLEX RESIDENCES

	Class 3-A	Class 3-B	Class 3-C	Class 3-D
Stories	2	2	2	2
Frame, 6" siding, sq. ft.	$5.50	$8.50	$10.00	$13.00
" " " cu. ft.	0.18½	0.28½	0.33½	0.43½
Frame, shingle & 8" & 10" siding, sq. ft.	5.61	8.67	10.20	13.26
" " " " " cu. ft.	0.18¾	0.29	0.34	0.44
Frame, plaster stucco, sq. ft.	5.72	8.84	10.40	13.52
" " " cu. ft.	0.19	0.29½	0.35	0.45
Brick veneer, sq. ft.	6.05	9.53	11.00	14.30
" " cu. ft.	0.20	0.31	0.36½	0.47½
Plaster or stucco on tile or brick, sq. ft.				14.17
" " " " cu. ft.				0.47
Brick veneer on tile or brick, sq. ft.	6.32			14.95
" " " " cu. ft.	0.20			0.50
Walls	As described	As described	As described	As described
Basement	Full conc. floor	Full conc. floor	Full conc. floor	Full conc. floor
Roof	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles	Gable, wood shingles
Attic	None	Unfinished	Unfinished	Unfinished
Interior finish	Pine	Hardwood or gum	Hardwood or gum	Hardwood
Floors	Pine	Oak	Oak	Oak
Plumbing	B. S. T. W., H. W. boiler each suite	B. S. T. W. L., H. W. boiler each suite	B. S. T. W. L., H. W. boiler each suite	B. S. T. W. L., H. W. boiler, tile B. each suite
Heating	H. A.	H. A.	H. A.	H. W. steam or vapor
Remarks	Light and cheap const.	Simple, good const.	May have tile B. faced	Moderately high-class well-fitted & finished, brick faced found. built-in tub

NOTE.—Cubic foot costs computed by authors.

TABLE 51.—PORTLAND, ORE. (1926)—TWO-FAMILY AND DUPLEX RESIDENCES

Item	Description and cost
Class	1
Stories	2
Cost, sq. ft.	$7.70
Cost, cu. ft.	0.25½
Standard area	1,080 sq. ft.
Rooms	10
Construction	Good
Foundation	Concrete
Basement	Full with concrete floor
Walls	Frame
Roof	Hip, wood shingles
Attic	Unfinished
Projections	2 dormers, 2 porches
Interior finish	Fir, plaster, papered, 4 rooms H. W. floors, tile bath
Built-in features	Bookcases, mantel, buffet, cabinets
Plumbing	S. B. T. W. L., each suite
Heating	Hot air, fireplace

NOTE.—Cubic foot costs computed by authors.

NOTE.—Deduct 15¢ per sq. ft. additional area for building having greater floor area than standard. Add 15¢ for similar deduction.

For physical depreciation see Table 31.

Deduct 6 to 10% for 1930.

The St. Paul system adds from 1 to 3¢ per cu. ft. for two-family or duplex houses to the figures for single residences given in Table 32.

Ordinary frame duplex flats in Milwaukee cost (1926) 30¢ per cu. ft.; ordinary veneered duplex flats 33¢ per cu. ft.

In the Cincinnati system (1930) Class 4 is for two-story, two-family residences having a tax value unit of $5.75 per sq. ft. and Class 4-A for two-story, two-family residences, elaborate design, having a tax value unit of $7.65 per sq. ft. The indexes to be applied are shown in Table 42. The calculated value is 80 per cent of true value.

In Los Angeles and other cities the cubic foot rate used for single residences is applied to two-family and duplex residences also.

Allen E. Beals, vice president of the Dow Service Co., New York, gives the cost (1929) of New York City 2½-story, frame, group constructed, two-family dwellings at 42¢ per cu. ft.

TABLE 52.—DENVER (1930)—BUNGALOW APARTMENTS AND COURTS
Classification No. 4

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	27	29	31	50	55	65	2.0	1.8	1.5	1	Full	Conc.	None	Brick or conc.

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick out, plaster in	None	Gable, shingle	Hard	Steam or hot water	S. B. T. W. each apt.	K. M. F. each apt.	Non-fire resisting

FIG. 31.—Denver bungalow apartments and court, brick A.
NOTE.—See Table 52.

TABLE 53.—PORTLAND, ORE. (1926)—BUNGALOW APARTMENTS AND COURTS

Item	Cost and description
Stories	1
Cost, sq. ft.	$3.50
Cost, cu. ft.	0.20
Suites	8
Rooms	4 per suite
Construction	Good
Foundation	Hollow, clay tile
Basement	Full, concrete floor
Walls	Stucco on frame
Roof	Flat, gravel
Attic	None
Projections	Small porches
Interior trim	Fir, enameled wood, plastered papered, all hardwood floors, tile finish bath
Built-in features	Bookcases, mantels, buffets, cabinets
Plumbing	S. B. T. W. L. each suite
Heating	Hot air, fireplace

NOTE.—Deduct 6 to 10% for 1930. For physical depreciation see Table 31.

The Los Angeles Building Owners and Managers Association gives the following costs for frame bungalow courts and apartments:

TABLE 54.—LOS ANGELES—FRAME BUNGALOW COURTS AND APARTMENTS

Description	Cost sq. ft.
Cheap construction	$4.25 to $5
Average "	5 to 6
Good "	6 to 7
Special "	7 to 8

NOTE.—Cost includes porches but not light courts.

FIG. 31.—Denver bungalow apartments and court, brick A.
NOTE.—See Table 52.

TABLE 53.—PORTLAND, ORE. (1926)—BUNGALOW APARTMENTS AND COURTS

Item	Cost and description
Stories	1
Cost, sq. ft.	$3.50
Cost, cu. ft.	0.20
Suites	8
Rooms	4 per suite
Construction	Good
Foundation	Hollow, clay tile
Basement	Full, concrete floor
Walls	Stucco on frame
Roof	Flat, gravel
Attic	None
Projections	Small porches
Interior trim	Fir, enameled wood, plastered papered, all hardwood floors, tile finish bath
Built-in features	Bookcases, mantels, buffets, cabinets
Plumbing	S. B. T. W. L. each suite
Heating	Hot air, fireplace

NOTE.—Deduct 6 to 10% for 1930. For physical depreciation see Table 31.

The Los Angeles Building Owners and Managers Association gives the following costs for frame bungalow courts and apartments:

TABLE 54.—LOS ANGELES—FRAME BUNGALOW COURTS AND APARTMENTS

Description	Cost sq. ft.
Cheap construction	$4.25 to $5
Average "	5 to 6
Good "	6 to 7
Special "	7 to 8

NOTE.—Cost includes porches but not light courts.

TABLE 55.—DENVER (1930)—FLATS AND TERRACES
Classification No. 5

Class	Cost cu. ft., cents		Life, years		Ann. phys. dep., %		Stories	Base-ment	Base-ment floor	Base-ment finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good						
Brick A	17	18	19	30	40	50	3.3	2.5	2.0	1	½	Conc.	None	Brick or conc.
" B	20	21	22	30	40	50	3.3	2.5	2.0	2	½	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick out, plaster in	None	Flat tar & gravel	Soft-wood	Stove	S. B. T. W. each apt.	None	Non-fire resisting
" B	" "	"	" "	"	H. A.	" "	K. C. M. F.	" "

FIG. 32.—Denver flat or terrace, brick B.
NOTE.—See Table 55.

TABLE 56.—ROCHESTER (1930)—FLATS AND TERRACES

	Class 6-A	Class 6-B	Class 6-C
Stories	2	2	2
Frame, shingle, 6" siding, sq. ft.	$4.00	$8.00	$10.00
" " 6" " cu. ft.	0.15	0.30	0.31
Frame, shingle, 8" & 10" siding, sq. ft.	.....	8.16	10.20
" " 8" & 10" siding, cu. ft.	.....	0.30½	0.32
Frame plaster, stucco, sq. ft.	4.16	8.32	10.40
" " " cu. ft.	0.15½	0.31	0.32½
Brick veneer, sq. ft.	4.40	8.80	11.00
" " cu. ft.	0.15½	0.32½	0.34½
Plaster or stucco on tile or block, sq. ft.	.....	.....	10.90
" " " " " " " cu. ft.	.....	.....	0.34
Brick veneer on tile or block, sq. ft.	4.60	9.20	11.50
" " " " " " cu. ft.	0.17	0.34	0.35
Walls	As described	As described	As described
Basement	Full conc. floor	Full conc. floor	Full conc. floor
Roof	Flat, gravel	Flat, gravel	Gable, shingles
Attic	None	None	Unfinished
Interior finish	Pine, few clo s., no built-in features	Hardwood or gum	Hardwood or gum
Floors	Pine	Oak	Oak
Plumbing	B. T. S. W., H. W. heater, each suite	B. T. S. W. L., H. W. boiler each suite	B. T. S. W. L., H. W. boiler each suite
Heating	Stove	Hot air	Hot air
Remarks	Light, cheap construction	Good, simple construction	Mod. high-class built-in tile B. & floor

NOTE.—Cubic foot costs computed by authors.

TABLE 55.—DENVER (1930)—FLATS AND TERRACES
Classification No. 5

Class	Cost cu. ft., cents		Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	17	18	19	30	40	50	3.3	2.5	2.0	1	½	Conc.	None	Brick or conc.
" B	20	21	22	30	40	50	3.3	2.5	2.0	2	½	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick out, plaster in	None	Flat tar & gravel	Soft-wood	Stove	S. B. T. W. each apt.	None	Non-fire resisting
" B	" "	"	" "	"	H. A.	" "	K. C. M. F.	" "

FIG. 32.—Denver flat or terrace, brick B.
NOTE.—See Table 55.

TABLE 56.—ROCHESTER (1930)—FLATS AND TERRACES

	Class 6-A	Class 6-B	Class 6-C
Stories	2	2	2
Frame, shingle, 6" siding, sq. ft.	$4.00	$8.00	$10.00
" " 6" " cu. ft.	0.15	0.30	0.31
Frame, shingle, 8" & 10" siding, sq. ft.	.....	8.16	10.20
" " 8" & 10" siding, cu. ft.	.....	0.30½	0.32
Frame plaster, stucco, sq. ft.	4.16	8.32	10.40
" " " cu. ft.	0.15½	0.31	0.32½
Brick veneer, sq. ft.	4.40	8.80	11.00
" " cu. ft.	0.15½	0.32½	0.34½
Plaster or stucco on tile or block, sq. ft.	.....	.....	10.90
" " " " " " " cu. ft.	.....	.....	0.34
Brick veneer on tile or block, sq. ft.	4.60	9.20	11.50
" " " " " " cu. ft.	0.17	0.34	0.35
Walls	As described	As described	As described
Basement	Full conc. floor	Full conc. floor	Full conc. floor
Roof	Flat, gravel	Flat, gravel	Gable, shingles
Attic	None	None	Unfinished
Interior finish	Pine, few clo s., no built-in features	Hardwood or gum	Hardwood or gum
Floors	Pine	Oak	Oak
Plumbing	B. T. S. W., H. W. heater, each suite	B. T. S. W. L., H. W. boiler each suite	B. T. S. W. L., H. W. boiler each suite
Heating	Stove	Hot air	Hot air
Remarks	Light, cheap construction	Good, simple construction	Mod. high-class built-in tile B. & floor

NOTE.—Cubic foot costs computed by authors.

TABLE 57.—PORTLAND, ORE. (1926)—FLATS AND TERRACES

	Class 1	Class 2	Class 3	Class 4	Class 5
Stories	2	2	2	1	2
Cost, sq. ft.	$2.20	$2.75 to $2.85	$3.05	$3.35	$7.70
Cost, cu. ft.	0.155	0.155 to 0.160	0.17	0.185	0.25
Standard area	.....	.....	.....	2,520 sq. ft.	2,560 sq. ft.
Rooms	.....	.....	.....	4 per suite	6 per suite
Construction	Cheap	Average	Good	Good	Good
Foundation	Conc.	Conc.	Conc.	Hollow clay, tile	Conc.
Basement	½ conc. floor	Full conc. floor	Full conc. floor	Full conc. floor	½ conc. floor
Walls	Siding	Siding	Stonestone stucco	Frame and stucco	Frame and stucco
Roof	Gable, wood shingles	Gable, wood, shingles	Flat, tar & gravel	Gable, wood shingles	Gable, wood shingles
Attic	Unfinished	Unfinished	Unfinished	Unfinished	Unfinished
Projections	None	None	None	4 dormers	4 dormers, 4 porches
Interior finish	Fir	Fir	Fir	Fir, enam. fin., plastered, pap. 3 H. W. floors each suite	Fir, enam. fin., plaster, pap. 4 H. W. floors each suite
Built-in features	None	Cabinets	Cabinets	Bk. Bu. K.	Bk. Bu. K.
Plumbing	S. B. T. W. each suite	S. B. T. W. each suite	S. B. T. W. L. each suite	S. B. T. W. L. each suite	2 T. 2 W. B. S. L. each suite, tile B. S.
Heating	Hot air	Hot air	Hot air	H. A. F.	H. A. F.

NOTE.—Cubic foot costs computed by authors.
Deduct 6 to 10 % for 1930.

Other Systems for Flats and Terraces.—St. Paul estimates flats or terraces from 1 to 2¢ more per cu. ft. than residences (see Table 32).

The Los Angeles Associated General Contractors give the cost (1927) of two-story flat frame buildings as follows:

TABLE 58.—LOS ANGELES (1927)—FRAME FLATS

Description	Cost sq. ft.
Cheap construction	$3.50 to $3.75
Average "	3.75 to 4.25
Good "	4.25 to 5.00
Special "	5.00 to 6.50

Grace and Bernieri, General Contractors, San Francisco, state that two-story flats with full basement (1925) cost 32¢ cu. ft.

The New York City average costs (1928) of flats and terraces are given in Table 59.

TABLE 59.—NEW YORK CITY (1928)—FLATS AND TERRACES

No.	Description	Cost cu. ft.		
		Poor	Aver.	Good
1	Frame, with full brick basements; cheap const.; flat, tar and gravel roof; pine floors and finish; stove heat; no bath; kitchen sink	$0.20	$0.24	$0.28½
2	Frame, with full basement; average construction; flat, tar and gravel roof; pine floors and finish; hot-air heat; baths	0.31	0.34	0.37
3	Brick, 1- and 2-family flats; cheap construction; full basement; flat, tar and gravel roof; pine floors and finish; stove heat; bath; sink	0.34	0.37	0.40
4	Brick, 1- and 2-family flats; average construction; full basement; flat, tar and gravel roof; pine floors and finish; hot-air heat; bath; sink; laundry	0.42½	0.45½	0.48½
5	Brick, 1- and 2-family flats; good construction; full basement; flat, tar and gravel roof; hardwood floors and finish; full set plumbing; steam heat	0.48½	0.53	0.57
6	Brick & stone, 3- to 5-story flats; steam heat; baths; laundry; flat, tar and gravel roof; hardwood floors; softwood finish; average construction	0.57	0.64	0.71
7	Brick & stone, 3- to 5-story flats; steam heat; baths; laundry; flat, tar and gravel roof; hardwood floors and finish; built-in features; ornamental brick and stone fronts; good const., full basement	0.71	0.78	0.85
8	Brick and concrete fire-resisting const.; full basement finished; flat, tar and gravel roof; hardwood floors and finish; first-class fully equipped plumbing; tile baths; steam heat; fireplace; mantel; cabinets; good construction	0.85	1.25	1.70

TABLE 60.—DENVER (1930)—TENEMENTS
Classification No. 6

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	18	19	20	30	40	50	3.3	2.5	2.0	2 or more	½	Conc.	None	Brick or conc.

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick out, plaster in	None	Flat, tar & gravel	Softwood	Stove	S. B. T. each apt.	None	Non-fire resisting

Tenement Houses.—Wilmont R. Evans, of Boston, states that a four-story common brick tenement cost from 43 to 44¢ per cu. ft. in 1927.

The 1928 cost of New York City tenements follows:

TABLE 61.—NEW YORK CITY (1928)—TENEMENTS

No.	Description	Cost cu. ft., cents		
		Poor	Aver.	Good
1	Frame; no basement; with or without stores; flat, tar and gravel roof; no baths; stove heat; pine floors and finish; cheap construction	25½	28	31
2	Frame; full basement; with or without stores; flat, tar and gravel roof; baths; hot-air heat; pine floors and finish; average construction	31	34	37
3	Brick; no basement; with or without stores; flat, tar and gravel roof; no baths; cold water; stove heat; pine floors and finish; cheap plumbing; cheap construction	28½	31	34
4	Brick; full basement; with or without stores; flat, tar and gravel roof; baths; steam heat; pine floors and finish; average construction	34	38	42½
5	Brick; full finished basement; with or without stores; flat, tar and gravel roof; baths; laundry; steam heat; hardwood floors and finish; good construction	42½	47	51

CHAPTER X

APARTMENT HOUSES

Standard Systems.—Apartment house construction in the United States approaches a more uniform standard than single or double residences. We find that apartment houses are nearly always constructed of reinforced concrete, brick or stone in conformity with certain principles of design and construction. Present-day construction demands the installation of many conveniences which were unknown a decade ago. Electric elevators, automatic refrigeration systems, incinerators, recreation and music rooms, automatic heating and ventilating systems, radio equipment, laundry equipment, extension telephones, electrical conveniences, improved lighting systems, soundproof and fireproof construction have become a part of modern apartment house construction.

The growing public demand for apartments has been accentuated by the desire for rest and comfort on the part of many. Both husband and wife often are employed during the day and their labors at home must be minimized as far as possible. Recreation is found at the theatre or in the automobile rather than at home.

Most apartment houses are constructed within convenient walking distance of the business sections of the city. In the larger cities, however, we find them built on, or adjacent to main traffic thoroughfares, where they are convenient for access to the business district.

TABLE 62.—DENVER (1930)—APARTMENT HOUSES
Classification No. 7

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	27	30	33	43	50	55	2.5	2.0	1.8	2 or more	½	Conc.	None	Brick or conc.
" B	31	33	35	40	50	55	2.5	2.0	1.8	"	½	"	Janitor's apts.	"
" C	32	36	38	40	50	55	2.5	2.0	1.8	"	Full	"	"	"
" D	40	43	46	55	70	80	1.8	1.4	1.25	"	"	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick out., plaster in.	None	Flat, tar & gravel	Softwd. or com. oak	Steam or H. W.	S. B. T. W. each apt. L basement	K. add for roller beds, ice boxes etc.	Non-fire resisting
" B	" "	"	" "	Hardwd.	"	" "	" "	Part brick and tile, 2 to 4 rms.
" C	" "	"	" "	"	"	" "	K. auto. refrig.	Fire resisting, buffet apts.
" D	" "	"	" "	"	"	" "	K. F. M. auto refrig. wall beds	Fire resisting, apts. all sizes

FIG. 33.—Denver apartment house, brick A.
NOTE.—See Table 62.

FIG. 34.—Denver apartment house, brick B.
NOTE.—See Table 62.

TABLE 63.—CLEVELAND (1930)—APARTMENT HOUSES[1]

	Class 1		Class 2		Class 3		Class 4	Class 5	
	2	3	2	3	2	3	2	2	3
Stories									
Frame, sq. ft.	$2.70	$3.90	$4.10	$5.70					
" cu. ft.	0.13	0.135	0.15	0.16					
Brick, sq. ft.	3.00	4.40	4.50	6.30	$5.30	$7.50	$6.00	$7.50	$10.20
" cu. ft.	0.14½	0.14½	0.16½	0.17½	0.18	0.20	0.20½	0.26	0.28
Walls	As described		As described		Brick		Brick	Brick	
Basement	Small		Full unfinished		Full unfinished		Full unfinished	Full unfinished	
Roof	Flat, tar & gravel		Flat, tar & gravel		Flat, tar & gravel		Flat, tar & gravel	Flat, tar & gravel	
Attic	None		None		None		None	None	
Projections	"		Front porches		"		Front porches	Front porches	
Interior finish	Pine		Pine		Pine finish, H. W. floors no built-in features		H. W. & white enam., M.	H. W. & white enam., M.	
Plumbing	S. B. T. W. each suite		S. B. T. W. each suite		S. B. T. W. each suite, L. basement		S. B. T. W. each suite, L. basement	S. B. T. W. L. each suite, L. basement	
Heating	Stove		Stove		H. A.		4 H. A.	Steam	
Area	1,500–3,000 sq. ft.		1,500–3,000 sq. ft.		4,000–6,000 sq. ft.		2,000–3,000 sq. ft.	2,000–3,000 sq. ft.	
Remarks	Simple const.		4 suites		6, 5 rm. suites		4, 5 rm. suites	6, 5 rm. suites	

NOTE.—Cubic foot costs computed by authors.
[1]From Zangerle's "Principles of Real Estate Appraising."

FIG. 33.—Denver apartment house, brick A.
NOTE.—See Table 62.

FIG. 34.—Denver apartment house, brick B.
NOTE.—See Table 62.

TABLE 63.—CLEVELAND (1930)—APARTMENT HOUSES[1]

	Class 1		Class 2		Class 3		Class 4	Class 5	
Stories	2	3	2	3	2	3	2	2	3
Frame, sq. ft.	$2.70	$3.90	$4.10	$5.70					
" cu. ft.	0.13	0.135	0.15	0.16					
Brick, sq. ft.	3.00	4.40	4.50	6.30	$5.30	$7.50	$6.00	$7.50	$10.20
" cu. ft.	0.14½	0.14½	0.16½	0.17½	0.18	0.20	0.20½	0.26	0.28
Walls	As described		As described		Brick		Brick	Brick	
Basement	Small		Full unfinished		Full unfinished		Full unfinished	Full unfinished	
Roof	Flat, tar & gravel		Flat, tar & gravel		Flat, tar & gravel		Flat, tar & gravel	Flat, tar & gravel	
Attic	None		None		None		None	None	
Projections	"		Front porches		"		Front porches	Front porches	
Interior finish	Pine		Pine		Pine finish, H. W. floors no built-in features		H. W. & white enam., M.	H. W. & white enam., M.	
Plumbing	S. B. T. W. each suite		S. B. T. W. each suite		S. B. T. W. each suite, L. basement		S. B. T. W. each suite, L. basement	S. B. T. W. L. each suite, L. basement	
Heating	Stove		Stove		H. A.		4 H. A.	Steam	
Area	1,500-3,000 sq. ft.		1,500-3,000 sq. ft.		4,000-6,000 sq. ft.		2,000-3,000 sq. ft.	2,000-3,000 sq. ft.	
Remarks	Simple const.		4 suites		6, 5 rm. suites		4, 5 rm. suites	6, 5 rm. suites	

NOTE.—Cubic foot costs computed by authors.
[1]From Zangerle's "Principles of Real Estate Appraising."

TABLE 63.—CLEVELAND (1930)—APARTMENT HOUSES.—(*Continued*)[1]

	Class 6		Class 7		Class 8		Class 9	
Stories	2	3	2	3	2	3	2	3
Frame, sq. ft								
" cu. ft								
Brick, sq. ft	$8.00	$10.50	$8.25	$10.80	$7.30	$11.00	$8.80	$11.80
" cu. ft	0.27½	0.28½	0.28½	0.29½	0.25	0.30	0.30½	0.32½
Walls	Brick		Brick		Brick		Brick, stone trim	
Basement	Full 2, 5 Rm. suites		Full conc. floor several suites		Full conc. floor		Full English type	
Roof	Flat, tar & gravel, tile cornice		Flat, tar & gravel, tile cornice		Flat, tar & gravel, tile cornice		Flat, tar & gravel, tile cornice	
Attic	None		None		None		None	
Projections	"		"		"		"	
Interior finish	H. W. & white enam., M., 1 door bed, H. W. floors, tile B.		H. W. & white enam., H. W. floors, tile B., door beds		H. W. & enam., H. W. floors, tile B., 17 door beds		Non-fireproof floors, tile B.	
Plumbing	S. B. T. W. each suite, L. basement		S. B. T. W. each suite, L. basement		S. B. T. W. each suite, L. basement		S. B. T. W. each suite, L. basement	
Heating	Steam		Steam		Steam		Steam	
Area	4,000–6,000 sq. ft.		4,000–6,000 sq. ft.		5,132 sq. ft.		5,000 sq. ft.	
Remarks	10, 5 rm. suites		3 & 4 rm. suites		17 suites 2 stores		36, 2 rm. suites	

NOTE.—Cubic foot costs computed by authors.

[1] From Zangerle's "Principles of Real Estate Appraising."

FIG. 35.—Denver apartment house, brick C.
NOTE.—See Table 62.

FIG. 36.—Denver apartment house, brick D.
NOTE.—See Table 62.

TABLE 63.—CLEVELAND (1930)—APARTMENT HOUSES.—(*Continued*)[1]

	Class 6		Class 7		Class 8		Class 9	
Stories	2	3	2	3	2	3	2	3
Frame, sq. ft								
" cu. ft								
Brick, sq. ft	$8.00	$10.50	$8.25	$10.80	$7.30	$11.00	$8.80	$11.80
" cu. ft	0.27½	0.28½	0.28½	0.29½	0.25	0.30	0.30½	0.32½
Walls	Brick		Brick		Brick		Brick, stone trim	
Basement	Full 2, 5 Rm. suites		Full conc. floor several suites		Full conc. floor		Full English type	
Roof	Flat, tar & gravel, tile cornice		Flat, tar & gravel, tile cornice		Flat, tar & gravel, tile cornice		Flat, tar & gravel, tile cornice	
Attic	None		None		None		None	
Projections	"		"		"		"	
Interior finish	H. W. & white enam., M., 1 door bed, H. W. floors, tile B.		H. W. & white enam., H. W. floors, tile B., door beds		H. W. & enam., H. W. floors, tile B., 17 door beds		Non-fireproof floors, tile B.	
Plumbing	S. B. T. W. each suite, L. basement		S. B. T. W. each suite, L. basement		S. B. T. W. each suite, L. basement		S. B. T. W. each suite, L. basement	
Heating	Steam		Steam		Steam		Steam	
Area	4,000–6,000 sq. ft.		4,000–6,000 sq. ft.		5,132 sq. ft.		5,000 sq. ft.	
Remarks	10, 5 rm. suites		3 & 4 rm. suites		17 suites 2 stores		36, 2 rm. suites	

NOTE.—Cubic foot costs computed by authors.

[1] From Zangerle's "Principles of Real Estate Appraising."

FIG. 35.—Denver apartment house, brick C.

NOTE.—See Table 62.

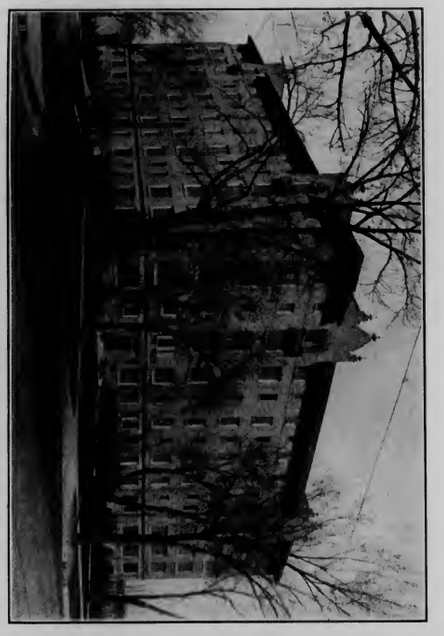


FIG. 36.—Denver apartment house, brick D.

NOTE.—See Table 62.

TABLE 64.—ROCHESTER (1930)—APARTMENT HOUSES

	Class A	Class B	Class C
Stories	2	2	2
Frame, shingle & 6″ siding, sq. ft.	$7.00	$13.00	$15.00
" " " " " cu. ft.	0.23½	0.43½	0.50
" " 8″ " 10″ " sq. ft.	.....	13.26	15.30
" " " " " " cu. ft.	.....	0.44	0.51
Frame, plaster and stucco, sq. ft.	.....	13.52	15.60
" " " " cu. ft.	.....	0.45	0.52
Brick veneer or brick, sq. ft.	7.70	14.30	16.50
" " " " cu. ft.	0.25½	0.47½	0.55
Walls	As described	As described	As described
Basement	Full conc. floor	Full conc. floor	Full conc. floor
Roof	Gable, shingles	Hip, shingles	Gable or hip wood shingles
Attic	Unfinished	Unfinished	Unfinished
Interior finish	Hardwood	Hardwood or gum	Hardwood or gum
Floors	Oak	Oak	Oak
Plumbing	B. T. S. W., H. W. boiler each apt.	B. T. S. W., H. W. boiler each apt.	B. T. S. W. L., H. W. boiler, each apt.
Heating	4 H. A.	4 H. A.	4 H. A.
Remarks	Light const. old type	Fairly modern type, fairly good const.	Modern type good const., tile floors

NOTE.—Cubic foot costs computed by authors.

TABLE 65.—PORTLAND, ORE. (1926)—APARTMENT HOUSES

	Class 1	Class 2	Class 3
Cost, sq. ft.	$2.20	$2.85	$13.00
Cost, cu. ft.	0.165	0.16	0.33½
Standard area	.....	.....	4,500 sq. ft.
Rooms	.....	.....	8, 2 rm. suites 12, 3 " "
Construction	Average	Good	Good
Foundation	Conc.	Conc.	Conc.
Basement	½ conc. floor	Full conc. floor	Full finished
Walls	Frame siding	Frame siding	Brick, terra cotta trim
Roof	Flat, tar and gravel	Flat, tar and gravel	Flat, tar and gravel
Attic	None	None	None
Projections	"	"	Iron fire escape
Interior finish	Fir	Fir	Fir, enam. wood, plastered, papered, H. W. floors, tile B.
Built-in features	K.	K.	K.
Plumbing	S. B. T. W. each suite	S. B. T. W. each suite, L. basement	S. B. T. W. each suite, L. basement
Heating	Steam	Steam	H. W. or steam
Remarks	Elevator, 1 to 3 stories	Elevator, 1 to 3 stories	3 stories and basement

NOTE.—Cubic foot costs computed by authors.
For 1930 costs deduct 6 to 10 %.

TABLE 66.—DULUTH (1930)—APARTMENT HOUSES

Age	Costs cu. ft., cents		
	Stove heat	Hot-air heat	Hot-water or steam heat
Under 10 years	22	23	25
10 to 15 years	21	22	24
Over 15 years	20	21	23

NOTE.—For pine floor and finish, reduce 2¢ on all classes.
Figure 1 per cent depreciation per year.

Chicago Apartments.—Gordon Strong and Co. of Chicago give the costs of apartments as shown in Table 67.

TABLE 67.—CHICAGO (1927)—APARTMENT HOUSES

Description	Cost cu. ft., cents
Small apartments, cheap construction, 1 bath, cheap fixtures, poor face brick and very little stone, low ceilings, poor millwork and floors, cheap hot-air heating plant	30
Small apartments, average construction, 1 bath, fixtures fair (not the cheapest), good face brick and stone work, usually with English basement and good heating plant, millwork and lumber good	33
Small apartments, good construction, 2 or 3 baths, many closets, well built throughout, good fixtures, best lumber and millwork, fine brick and stone work. Chicago "co-ops" on south side are good examples of this class of construction	35
Fireproof apartments, 3 story, usually concrete slab on brick bearing walls, cheap fireproof construction but satisfactory for 3 or 4 floors	45 to 50
Large fireproof apartments	60 to 70

NOTE.—The above figures represent the physical value of building. Nothing has been added for financing, architects fees, or carrying charges.

Wilmot R. Evans states that the brick apartments in Boston (1927) cost from 50 to 54¢ per cu. ft. for 4 stories with no improvements; 62 to 65¢ per cu. ft. for 4 stories with improvements

including heat, and from 62 to 63¢ per cu. ft. for 3- and 4-story apartments with stores on the first floor and improvements.

John E. Parsons estimates the average cost (1925) of small apartments at 40¢ and large apartments at 51¢.

John M. Bischoff, commissioner of buildings and safety engineering, estimates the cost (1928) of apartments in Detroit to be as follows: brick veneer 28¢ cu. ft.; ordinary brick 29½¢ cu. ft.; protected 44½¢ cu. ft; fireproof 50¢ cu. ft.

Gordon White, Denver architect, estimates the cost (1926) of apartments to be 32¢ per cu. ft. for 2-story brick; 37¢ cu. ft. for 3-story brick; 42 to 45¢ cu. ft. for first-class apartments.

Jay T. Williams, chief Denver building inspector, finds the cost (1926) of modern brick apartment houses to be from 30 to 33¢ for small apartments and 34¢ for large apartments.

Engineering News-Record reports the average cost of all apartments constructed in the United States in 1927 to be $4.75 per sq. ft. of floor area.

The Los Angeles Associated General Contractors show the cost (1927) of apartments to be as follows:

	Cu. ft., cents
Class A, steel frame apartments	55 to 70
Class B, reinforced concrete apartments	50 to 65
Class C, brick apartments	30 to 50

W. E. Corning of Birmingham, member of the Alabama State Tax Commission, states that the average cost (1928) of non-fireproof brick apartments is 31.8¢, steel and concrete apartments 56.4¢ and reinforced concrete apartments 54.3¢ per cu. ft.

In Minneapolis (1927) average constructed brick apartments cost from 22 to 26¢ per cu. ft. and fireproof apartments from 26 to 35¢ cu. ft. Average construction in four-flat brick flats costs from 22 to 24¢ and good construction from 24 to 28¢ per cu. ft. Four-flat stucco houses, average construction, cost from 18 to 22¢ per cu. ft. and good construction from 20 to 24¢ per cu. ft.

Apartment houses in San Francisco cost (1925) 61¢ per cu. ft. for Class A; 56¢ for Class B; 43¢ for Class C; and the highest type of community apartments cost 65¢ per cu. ft.

The cost of apartments in New York City as compiled by Allen E. Beals, vice president of The Dow Service Daily Building Reports, is given in Table 68.

TABLE 68.—NEW YORK CITY (1929)—APARTMENT HOUSES[1]

Description	Cost cu. ft. cents
5 story, no elevator, non-fireproof, brick	42
5 " automatic elevator, brick	50
6 " semi-fireproof, brick	53
10 " Park Ave. type, fireproof steel brick and stone	77
15 " type speculative, steel, brick and stone	76
2½ " 4 family, non-fireproof, frame	38
3 " 6 family, single heating plant, brick and wood	40

NOTE.—These figures do not include the cost of financing, surveys, contractors profit, etc. Contractors profit averages 2½%.

[1] Dow Service, May, 1929.

Other figures on New York City apartment houses are shown in Table 69.

TABLE 69.—NEW YORK CITY (1930)—APARTMENTS

Description	Cost cubic feet		
	Poor	Aver.	Good
Brick, average construction, flat, tar and gravel roof, steam heat, 2- to 4-room suites with private baths, hardwood floors, kitchen cabinets	$0.51	$0.57	$0.62½
Brick, ornamental front, flat, tar and gravel roof, steam heat, 2- to 5-room suites with private tiled baths, built-in cabinets, hardwood floors and finish	0.62½	0.74	0.85
First-class fire-resisting reinforced concrete apartments, flat, tar and gravel roof, steam heat, 2- to 5-room suites with private tiled baths, elevators, automatic refrigeration, hardwood floors and finish, good interior decorating, built-in cabinets	0.85	1.12	1.40

Reducing apartment building costs for the years 1907 to 1922 inclusive to present-day reproduction costs, by applying a proper cost factor, we find that figures submitted by William Arthur in his "Appraisers' and Adjusters' Handbook" give an average cost of 45¢ per cu. ft. for first-class fire-resisting apartments and 40¢ per cu. ft. for good construction brick apartments.

St. Paul pressed-brick apartments cost (1930) from 22 to 33¢ per cu. ft., reinforced concrete apartments from 30 to 50¢ per cu. ft. and steel frame apartments from 33 to 55¢ per cu. ft. The St. Paul table for physical depreciation of buildings follows:

TABLE 70.—ST. PAUL APARTMENT BUILDING DEPRECIATION TABLE

Type of building	Annual physical depreciation, %		
	Poor	Aver.	Good
Frame	4	3	2
Stucco on frame	3½	2½	1¾
Ordinary brick, old construction	3	2	1½
Concrete blocks	3	2	1½
Brick veneer on frame	3½	2½	1¾
Stucco on tile	3	2	1½
Solid pressed brick	3	2	1½
Mill construction	2½	1¾	1¼
Protected construction	2½	1¾	1¼
Reinforced concrete	2	1½	1
Steel frame	2	1½	1

Milwaukee brick apartment buildings cost (1930) 38 to 40¢ per cu. ft. and fire-resisting apartment buildings 42 to 45¢ per cu. ft.

The city of Los Angeles used the following cost factors on apartment houses:

TABLE 71.—LOS ANGELES (1930)—APARTMENT HOUSES

Apartments	Cost sq. ft.						
	Poor	Aver.	Aver. plus	Good	Good plus	Special	Extra
Frame, Class D	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00
Brick " C	2.00	2.25	2.50	2.75	3.00	3.25	

The Cincinnati system shows the following costs on apartment houses with or without stores:

TABLE 72.—CINCINNATI (1930)—APARTMENT HOUSES

Class	Description	Cost cu. ft., cents
A-1	Modern, fire-resisting, good construction	50
A-2	" " " average construction	40
B-1	Ordinary type, modern, good construction	35
B-2	" " " cheap construction	30

Apartment Hotels.—Just recently apartment hotels have been constructed in a number of cities. They have a lobby and public dining room together with stores on the first floor and small apartments equipped for light housekeeping on the upper floors with private baths. The Cincinnati apartment hotel costs are given in Table 73. The Denver classification and cost on apartment hotels is given in Table 74.

TABLE 73.—CINCINNATI (1930)—APARTMENT HOTELS

Class	Description	Cost cu. ft., cents
A-1	Fire-resisting, modern, high-grade, good construction	60
A-2	" " average construction	50
B-1	Non-fire resisting, not modern	35
B-2	" " " cheap ordinary construction	25

TABLE 74.—DENVER (1930)—APARTMENT HOTELS

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Base-ment	Base-ment floor	Base-ment finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	40	43	46	50	55	65	2	1.8	1.5	2 or more	Full	Conc.	None	Brick or conc.

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, plaster fin.	None	Flat	1st. grade H. W.	Steam or H. W.	S. B. T. W. each apt.	Dining rm., lobby & kitchen	Non-fire resisting

CHAPTER XI

HOTEL BUILDINGS

Modern Hotel Construction.—The invention and development of high-speed elevators has made possible multistory hotel and office building construction.

In modern hotel construction the tendency is to equip every room with a bath. Radio installations are becoming popular. The installation of wall beds is quite common. Modern design practically eliminates sunless rooms by the construction of courts. Roof gardens, airplane landing and demonstration spaces upon the roofs of hotels are being constructed to meet public demands. In several instances bungalow residences have been constructed upon the roofs of hotel buildings. The installation of automatic ventilation systems affords greater living comfort. Display, convention and ballrooms are to be found in modern hotel construction.

Hotels are no longer confined to the crowded retail centers of our large cities. During recent years many have been constructed in the more open spaces fronting on parks, boulevards and plazas in the outlying districts.

The cost of hotel buildings in various cities of the United States is given in the following pages.

TABLE 75.—DENVER (1930)—HOTELS

Classification No. 9

Class	Cost cu. ft, cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	28	31	34	40	50	55	2.5	2	1.8	2 or more	½	Conc.	None	Brick or conc.
" B	39	41	43	55	65	70	1.8	1.5	1.4	"	"	"	"	"
" C	45	47	49	80	90	100	1.25	1.1	1	"	Full	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, plaster fin.	None	Flat	Softwood	Steam	2 B. T. each floor	None	Non-fire resisting
" B	" "	"	"	"	"	" " private bath	Lobby, pub. dining rm. kitchen elevator	Fire resisting
" C	" "	"	"	"	"	Pr. B. & T. most rooms	" "	"

NOTE.—Deduct 3¢ from cubic foot rate for full basement, Class A and B. Deduct 6¢ per cu. ft. for non-fire-resisting construction, and 2¢ per cu. ft. where first floor is store construction, Class B.

FIG. 37.—Denver hotel, brick A.
NOTE.—See Table 75.

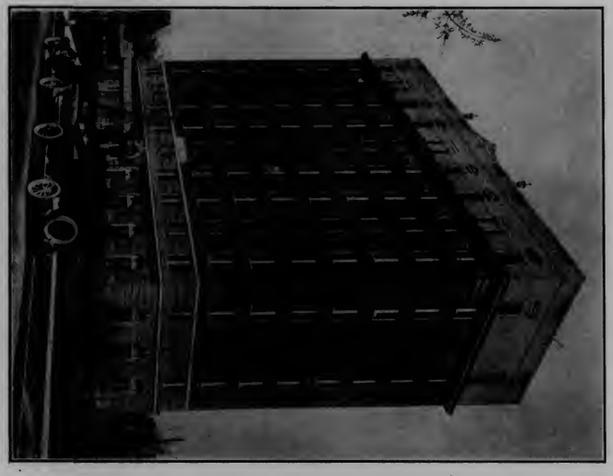


FIG. 38.—Denver hotel, brick C.
NOTE.—See Table 75.

TABLE 75.—DENVER (1930)—HOTELS

Classification No. 9

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	28	31	34	40	50	55	2.5	2	1.8	2 or more	½	Conc.	None	Brick or conc.
" B	39	41	43	55	65	70	1.8	1.5	1.4	"	"	"	"	"
" C	45	47	49	80	90	100	1.25	1.1	1	"	Full	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, plaster fin.	None	Flat	Softwood	Steam	2 B. T. each floor	None	Non-fire resisting
" B	" "	"	"	"	"	" " private bath	Lobby, pub. dining rm. kitchen elevator	Fire resisting
" C	" "	"	"	"	"	Pr. B. & T. most rooms	" "	"

NOTE.—Deduct 3¢ from cubic foot rate for full basement, Class A and B. Deduct 6¢ per cu. ft. for non-fire-resisting construction, and 2¢ per cu. ft. where first floor is store construction, Class B.

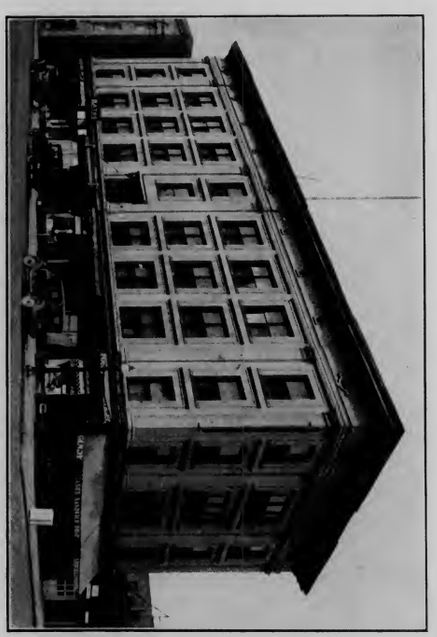


FIG. 37.—Denver hotel, brick A.
NOTE.—See Table 75.

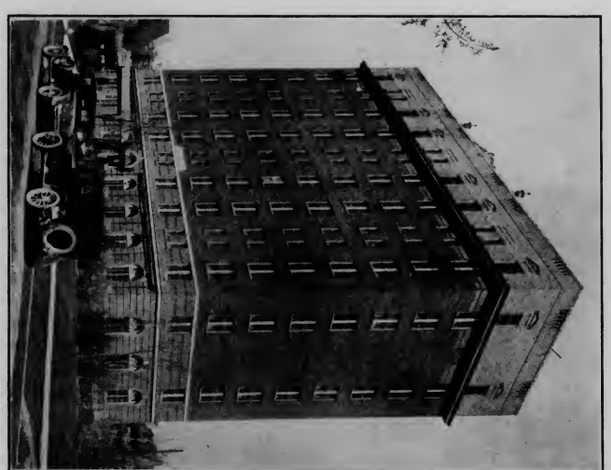


FIG. 38.—Denver hotel, brick C.
NOTE.—See Table 75.

TABLE 76.—CLEVELAND (1930)—HOTELS[1]

No.	Description	Cost cu. ft., cents
1	Steel frame, face brick and terra cotta in all exterior walls, 200 guest rooms with bath, small ground floor occupancy, 13 stories, standard cubage, 1,048,801 cu. ft.	60
2	Modern steel frame, fire resisting, containing small shops on ground floor, 2 inner courts, 950 guest rooms with bath. Brick exterior trimmed with terra cotta and stone, 12 stories, standard cubage, 7,185,507 cu. ft.	60
3	High class, fire resisting, containing 400 rooms in suites of 2 to 8 rooms with 260 baths. Interior finish ornamentally detailed oak, 3 passenger and 1 freight elevators, 11 stories, standard cubage, 3,864,236 cu. ft.	60
4	Steel-frame, fire-resisting hotel containing 131 suites of 1 to 3 rooms and bath, 6 stores and 9, 1-room suites on first floor, typical floors have 20 suites, 3 elevators, 8 stories, standard cubage, 975,535 cu. ft.	63

[1] From Zangerle's "Principles of Real Estate Appraising."

TABLE 77.—PORTLAND, ORE. (1926)—HOTELS

No.	Description	Cost cu. ft., cents
1	Reinforced concrete and steel, 13 stories, basement and subbasement, exterior finish of tile or brick veneer, mansard or flat roof, interior finish walnut or mahogany, 198 guest rooms with bath, large lobby finished in walnut, 3 large dining rooms, marble stairways and halls, tile baths, 2 elec. elevators, steam heat, first-class plumbing fixtures throughout. 4 fire escapes; standard cubage, 1,000,000 cu. ft.	90
2	Reinforced concrete with brick facing and trim, flat, tar and gravel roof, full basement, first and mezzanine floors finished in oak and mahogany, second to eleventh floors finished in fir, marble floor in lobby, 203 guest rooms, 145 baths, 91 showers, all rooms attached to toilet rooms, steam heat, first-class plumbing fixtures throughout, 2 elec. elevators, 1 fire escape	85

For 1930 deduct 6 to 10%.

Wilmot R. Evans, of Boston, states that the cost (1927) of old-style brick and stone hotels is 72¢ per cu. ft. and modern 10- and 12-story hotels, steel-frame construction, is 90¢ per cu. ft.

In Birmingham reinforced concrete hotels cost (1928) 62.1¢ per cu. ft. average.

The Manufacturers Appraisal Co. report Chicago hotel buildings to cost (1928) from 30 to 50¢ per cu. ft. for non-fireproof buildings and 50 to 70¢ for fire-resisting buildings.

Gordon, Strong and Co. of Chicago gives the cost (1928) for large fireproof hotels from 60 to 70¢ per cu. ft.

John E. Parsons, realtor, has compiled figures showing that the average cost (1925) of a medium-class hotel is 48¢ per cu. ft. and the average cost of a high-class hotel is 67¢ per cu. ft. According to the Detroit City Building Department, ordinary non-fireproof hotels cost (1928) 31¼¢ per cu. ft. and high-class fire-resisting hotels cost 55½¢ per cu. ft.

H. P. Gillette of Chicago gives the cost of hotels (1902): first class, 31 to 41¢; second class, 23 to 31¢; third class, 20 to 24¢. Referring these prices to present-day costs by applying a factor of 168, we have first-class hotels, 52 to 68½¢ per cu. ft.; second-class hotels, 38½ to 52¢; third-class hotels, 33½ to 40¢ per cu. ft.

W. N. Bowman, Denver architect, finds that non-fireproof hotels cost (1926) from 30 to 45¢ per cu. ft. and fireproof hotels from 45 to 90¢ per cu. ft.

The average cost of hotels constructed in the United States in 1927 was $8.20 per sq. ft. according to the *Engineering News-Record*. William Arthur in his "Appraisers and Adjusters Handbook" gives the actual cost figures on 11 first-class fire-resisting hotels constructed between 1907 and 1920. Applying proper yearly cost index factors to establish all costs on a 1930 reproduction cost basis, the average cost is 52½¢ per cu. ft.

Class A hotels in San Francisco (1925) cost 62¢ per cu. ft. and class B hotels 57¢ per cu. ft. St. Paul hotels cost (1924) from 22 to 33¢ per cu. ft. for brick; 33 to 46¢ per cu. ft. for reinforced concrete; and 35 to 51¢ per cu. ft. for steel-frame construction.

The cost of old-style 2-, 3- and 4-story hotels in Milwaukee is 35¢ per cu. ft. and modern fire-resisting hotels from 4 to 10 stories is 50¢ per cu. ft.

The Los Angeles Associated General Contractors state that Class A steel-frame construction hotels cost (1927) from 55 to

70¢ per cu. ft.; Class A reinforced concrete hotels from 45 to 65¢ per cu. ft.; and Class C brick hotels from 25, to 45¢ per cu. ft.

In Cincinnati (1930) fire-resisting, modern, good construction hotels cost 60¢ per cu. ft.; non-fire resisting, average construction hotels 50¢ per cu. ft.; fire-resisting, not modern hotels 35¢ per cu. ft.; and non-fire resisting, ordinary, cheap construction hotels 25¢ per cu. ft.

Allen E. Beals of the Dow Service, New York, gives the May, 1929, cost of New York City hotels as follows: 18-story, Roosevelt type, no equipment, 98¢ per cu. ft.; 20-story Manger type, all equipped, $1.05 per cu. ft.; 20-story Manger type, no equipment, 95¢ per cu. ft.; 33-story Savoy-Plaza type, no equipment, $1.21 per cu. ft.; 16-story Alden Hotel type, 84¢.

CHAPTER XII

STORE BUILDINGS

Modern Store Construction.—Store construction and location, like the merchandising business, has been undergoing rapid changes and development during the past few years. The decentralization of retail business has been brought about by the expansion of retail chain-store organizations. Branch stores in practically every line of merchandising have been established in residential districts where traffic conditions are not a hindrance and the maximum of convenience and ease of shopping is afforded. The purchase of cheap ground for the construction of store buildings also has favorably influenced the construction of suburban store buildings.

The psychology of modern merchandising demands well-constructed, attractive, spacious store buildings. Large plate-glass store fronts, behind which are well-built, attractive display spaces, are essential construction features. Better lighting, heating and ventilating systems are being installed. Electrical appliances and displays mark an important advancement in this type of construction. In the central business district front arcades for pedestrian traffic and rear arcades for loading and unloading facilities are becoming more in demand. The cost of modern store buildings is given in the following pages.

TABLE 78.—DENVER (1930)—STORE BUILDINGS

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Base-ment	Base-ment floor	Base-ment finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Frame A	13	15	17	25	30	40	4	3.3	2.5	1	None	None	None	Brick or conc.
Brick A	14	16	18	25	30	40	4	3.3	2.5	1	¼	Conc.	"	"
" B	17	19	21	30	40	50	3.3	2.5	2	1	Full	"	"	"
" C	20	22	24	40	50	55	2.5	2	1.8	2	½	"	"	"
										1st stores 2d apts.				
" D	23	25	27	40	50	55	2.5	2	1.8	2 or more	Full	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks	Remarks
Frame A	Siding out, plaster in	None	Flat	Softwood	Stove	S. T.	None	Non-fire resisting	9" brick walls wood interior const. Plate-glass front, tile trim 9" brick walls, cast-iron or steel cols., steel trusses
Brick A	Brick walls, plaster fin.	"	"	"	Hot air	S. T.	"	"	
" B	" "	"	"	"	Steam	S. T.	"	"	
" C	" "	"	"	"	Stove	T. 1st floor 2 T. & B. 2d floor	"	"	
" D	" "	"	"	"	Steam	T. W. each floor	Elevator	"	

TABLE 79.—CLEVELAND (1930)—ONE-STORY STORE BUILDING[1]

	Class 1	Class 2		Class 3	
Stories	1	Not over 3 stores	5 or more stores	Not over 3 stores	5 or more stores
Frame, sq. ft	$1.60				
" cu. ft	0.11½				
Brick, sq. ft	1.80	$2.60	$1.80	$3.20	$2.40
" cu. ft	0.13½	0.12½	0.9	0.15	0.11
Walls	Frame, drop siding; Brick, face-brick front	Brick without ornamentation		Brick with ornamentation	
Basement	None	Full		Full	
Roof	Flat, tar & gravel	Flat, tar & gravel		Flat, tar & gravel	
Attic	None	None		None	
Projections	"	"		"	
Interior finish	Plain pine	Plain pine		Plain pine, maple floors	
Plumbing	S. T.	S. T. each store		S. T. each store	
Heating	Stove	Gas stoves		H. A. each store	
Remarks	Cheap const.	Simple const.		Good const.	

[1] From Zangerle's "Principles of Real Estate Appraising."

NOTE.—Cubic foot cost computed by authors.

FIG. 39.—Denver store building, frame A.
NOTE.—See Table 78.

FIG. 40.—Denver store building, brick B.
NOTE.—See Table 78.

TABLE 80.—CLEVELAND (1930)—STORES AND APARTMENTS[1]

	Class 1		Class 2		Class 3		Class 4			Class 5		Class 6	
Stories	2	3	2	3	2	3	2	3		2		2	
Frame, sq. ft.	$2.40	$3.50											
" cu. ft.	0.10	0.10½											
Brick, sq. ft.	2.70	3.90	$4.80	$7.50	$6.00	$8.70	$6.80	$9.80		$8.30		$10.50	
" cu. ft.	0.11½	0.12	0.15	0.18	0.19	0.20½	0.20½	0.23		0.25½		0.31	
Walls	Frame, drop siding		Face-brick front		Face-brick front		Face-brick front and side wall			Face-brick, terra cotta trim		Face-brick & tile trim or stucco on b.	
	Brick { face-brick front only												
Basement	None		Full		Full		Full			Full		Full	
Roof	Flat, tar & gravel		Flat, tar & gravel		Flat, tar & gravel		Flat, tar & gravel			Flat, tar & gravel		Flat conc.	
Attic	None		None		None		None			None		None	
Projections	"		"		"		"			"		"	
Interior finish	Pine		Pine		H. W. fin. & floors in living rm., pine finish on floors in stores		H. W. floors & fin. in living rms., tile B., pine fin. & H. W. floors in store			Hardwood throughout		Conc. floors, marble and tile interior trim	
Plumbing	T. S. store & suites, S. T. each store		S. T. W. B. each suite, S. T. each store		S. B. T. W. each suite, S. T. each store		S. B. T. W. each suite, S. T. each store			2 S. T. 1st floor S. B. T. W. each suite 2d floor		S. T. each store, 10 fixtures 2d floor	
Heating	Stove		Gas stove		H. A.		H. W., steam, vapor			Steam		Steam	
Area	1,500–4,000 sq. ft.		2,000–5,000 sq. ft.		2,500–5,000 sq. ft.		2,000–5,000 sq. ft.			5,226 sq. ft.		9,000 sq. ft.	
Remarks	Simple const., store below, apts. above		Cheap const., store below, apts. above		On interior lot, store below, apts. above		Good const. corner lot, store below, apts. above			Good const. corner, store below; apts. above, 1st floor 9 offices, bank on corner		1st class const., 8 stores 1st floor; resturant 1st floor, D. R. kitchen, stage 2d floor	

[1] From Zangerle's "Principle of Real Estate Appraising."
NOTE.—Cubic foot costs computed by authors.
For physical depreciation see Table 26.

FIG. 39.—Denver store building, frame A.
NOTE.—See Table 78.

FIG. 40.—Denver store building, brick B.
NOTE.—See Table 78.

TABLE 80.—CLEVELAND (1930)—STORES AND APARTMENTS[1]

	Class 1		Class 2		Class 3		Class 4			Class 5			Class 6	
Stories	2	3	2	3	2	3	2	3		2			2	
Frame, sq. ft.	$2.40	$3.50	$4.80	$7.50	$6.00	$8.70	$6.80	$9.80		$8.30			$10.50	
" cu. ft.	0.10	0.10½	0.15	0.18	0.19	0.20½	0.20½	0.23		0.25½			0.31	
Brick, sq. ft.	2.70	3.90												
" cu. ft.	0.11½	0.12												
Walls	Frame, drop siding		Face-brick front		Face-brick front		Face-brick front and side wall			Face-brick, terra cotta trim			Face-brick & tile trim or stucco on b.	
	Brick { face-brick front only													
Basement	None		Full		Full		Full			Full			Full	
Roof	Flat, tar & gravel		Flat, tar & gravel		Flat, tar & gravel		Flat, tar & gravel			Flat, tar & gravel			Flat conc.	
Attic	None		None		None		None			None			None	
Projections	"		"		"		"			"			"	
Interior finish	Pine		Pine		H. W. fin. & floors in living rm., pine finish on floors in stores		H. W. floors & fin. in living rms., tile B., pine fin. & H. W. floors in store			Hardwood throughout			Conc. floors, marble and tile interior trim	
Plumbing	T. S. store & suites, S. T. each store		S. T. W. B. each suite, S. T. each store		S. B. T. W. each suite, S. T. each store		S. B. T. W. each suite, S. T. each store			2 S. T. 1st floor S. B. T. W. each suite 2d floor			S. T. each store, 10 fixtures 2d floor	
Heating	Stove		Gas stove		H. A.		H. W., steam, vapor			Steam			Steam	
Area	1,500–4,000 sq. ft.		2,000–5,000 sq. ft.		2,500–5,000 sq. ft.		2,000–5,000 sq. ft.			5,226 sq. ft.			9,000 sq. ft.	
Remarks	Simple const., store below, apts. above		Cheap const., store below, apts. above		On interior lot, store below, apts. above		Good const. corner lot, store below, apts. above			Good const. corner, store below, apts. above, 1st floor 9 offices, bank on corner			1st class const., 8 stores 1st floor, restaurant 1st floor, D. R. kitchen, stage 2d floor	

[1] From Zangerle's "Principle of Real Estate Appraising."
NOTE.—Cubic foot costs computed by authors.
For physical depreciation see Table 20.

TABLE 81.—ROCHESTER (1930)—ONE-STORY STORES

	Class A	Class B	Class C
Stories	1	1	1
Frame, sq. ft.	$2.50	$3.50	
" cu. ft.	0.21	0.24	
Conc. block, brick front, sq. ft.		4.00	$4.50
" " " " cu. ft.		0.27½	0.23
Common brick, face br. front, sq. ft.			5.50
" " " " " cu. ft.			0.28
Walls	Frame siding	As described	Face-brick front, as described
Basement	None	½ conc. floor	Full conc. floor
Roof	Flat, tar & gravel	Flat, tar & gravel	Flat, tar & gravel
Attic	None	None	None
Interior finish	Plain pine	Plain pine	Plain pine
Floors	Pine	Pine	Pine
Plumbing	S. T. each store	S. T. each store	S. T. each store
Heating	Stove	H. A.	H. A.
Remarks	Very cheap const.	Average const.	Good const.

NOTE.—Cubic foot costs computed by authors.
For face-brick sidewalls add $1.50 per lin. ft.

FIG. 41.—Denver store building, brick D.
NOTE.—See Table 78.

TABLE 81.—ROCHESTER (1930)—ONE-STORY STORES

	Class A	Class B	Class C
Stories	1	1	1
Frame, sq. ft	$2.50	$3.50	
" cu. ft	0.21	0.24	
Conc. block, brick front, sq. ft		4.00	$4.50
" " " " cu. ft		0.27½	0.23
Common brick, face br. front, sq. ft			5.50
" " " " " cu. ft			0.28
Walls	Frame siding	As described	Face-brick front, as described
Basement	None	½ conc. floor	Full conc. floor
Roof	Flat, tar & gravel	Flat, tar & gravel	Flat, tar & gravel
Attic	None	None	None
Interior finish	Plain pine	Plain pine	Plain pine
Floors	Pine	Pine	Pine
Plumbing	S. T. each store	S. T. each store	S. T. each store
Heating	Stove	H. A.	H. A.
Remarks	Very cheap const.	Average const.	Good const.

NOTE.—Cubic foot costs computed by authors.
For face-brick sidewalls add $1.50 per lin. ft.

FIG. 41.—Denver store building, brick D.
NOTE.—See Table 78.

TABLE 82.—ROCHESTER (1930)—STORES AND APARTMENTS

	Class A	Class B	Class C
Stories	2	2	2
Frame, shingle or 6″ siding, sq. ft.	$6.00	$6.75	
" " " " " cu. ft.	0.20½	0.23	
Plaster, stucco, sq. ft.	6.25	7.00	
" " cu. ft.	0.21½	0.24	
Brick, veneer on frame, sq. ft.		7.50	$8.00
" " " " cu. ft.		0.26	0.27½
Brick veneer on tile, sq. ft.		8.25	9.00
" " " " cu. ft.		0.28½	0.31
Brick, sq. ft.		8.75	9.50
" cu. ft.		0.30	0.32½
Concrete block, sq. ft.	6.50		
" " cu. ft.	0.22½		
Walls	As described	As described	As described
Basement	Full conc. floor	Full conc. floor	Full conc. floor
Roof	Flat, tar & gravel	Flat, tar & gravel	Flat, tar & gravel
Attic	None	None	None
Interior finish	Pine	Hardwood or gum	Hardwood or gum
Floors	"	Oak	Oak
Plumbing	S. T. each store S. B. T. W. each suite	S. B. T. W., H. W. boiler each suite, S. T. each store	S. B. T. W., H. W. boiler, each suite, may have tiled or built-in baths. S. T. each store
Heating	H. A.	H. A.	H. A.
Remarks	Cheap const., stores below, apts. above	Simple good const., stores below, apts. above	Good const., ornamented brickwork, heavy cornice

NOTE.—Cubic foot costs computed by authors.
For face-brick side walls add $2 per lin. ft.

TABLE 83.—PORTLAND, ORE. (1926)—STORE BUILDINGS

Description	1	2	3	4	5	6	7
Type of construction	Conc. wall	Brick & conc.	Com. brick & conc.	Com. brick & conc.	Frame	Frame	Frame
Kind of construction	Aver.	Aver.	Aver.	Cheap	Good	Aver.	Cheap
Basement	None	Full	Full	None	Full	Full	½
Roof	Flat, tar & gravel	Flat, tar & gravel	Flat, tar & gravel	Flat, tar & gravel	Flat, tar & gravel	Flat, tar & gravel	Flat, tar & gravel
Interior finish	Plain fir, plastered	Plain fir, plastered	Plain fir, plastered	Plain fir, plastered	Plain fir, plastered	Plain fir, plastered	Plain fir, plastered
Heating	Stove	Steam	Steam	Stove	Steam	Steam	Stove
Plumbing	S. T. each store	S. T. each store S. T. B. W. each apt.	S. T. each store S. T. B. each flr.	S. T. each store S. T. B. each flr.	S. T. each store	S. T. each store	S. T. each store
Cost per sq. ft.	$1.10–$1.15	$2.50–$3.30	$1.70–$2.40	$1.20–$1.40	$2.10–$2.50	$1.70–$2	$1–$1.20
Cost per cu. ft.	0.08–0.09½						
Remarks		Apts. above	Apts. above, elevator				

For 1930 costs deduct 6 % to 10 %.

Cost of Store Buildings in Other Cities.—In Boston one-story brick stores with full basement cost (1927) $7 to $8.50 per sq. ft. or 33½ to 40¢ per cu. ft.; two-story brick veneer with full basement and stores below with apartments above cost 14 to 16¢ per cu. ft.; two-story brick store buildings with full basement, having stores below and apartments above, cost 18 to 22¢ per cu. ft.; one-story stucco store buildings, no basement, not modern, cost 10 to 12¢ per cu. ft.

In Los Angeles two-story Class C brick buildings with stores below and apartments above cost (1930) 25 to 45¢ per cu. ft. One story Class C brick stores cost from $2 to $3.25 per sq. ft.

The average cost of reinforced concrete store buildings in Birmingham (1928) is 29½¢ per cu. ft. and for non-fireproof store buildings 17.9¢ per cu. ft.

Gordon Strong and Co. give the cost (1927) of one-story brick store buildings in Chicago at 26¢ per cu. ft.

The Detroit assessor (1930) figures one-story frame store buildings from 16 to 20¢ per cu. ft.; brick veneer store buildings, with no basement, from 18 to 23¢ per cu. ft.; brick veneer with flats above from 22 to 29¢ per cu. ft.; brick stores from 23 to 30¢ per cu. ft.; semi-fireproof constructed stores from 24 to 32¢ per cu. ft.; fireproof stores from 35 to 50¢ per cu. ft.

W. N. Bowman, Denver architect, states that one-story full basement brick store buildings cost (1926) from 15 to 20¢ per cu. ft.

From figures submitted by William Arthur for the cost of store buildings in Omaha, we find that the present-day reproduction cost on first-class fireproof store buildings varies from 27 to 45¢ per cu. ft. and for ordinary brick store buildings from 18 to 28¢ per cu. ft.

In Duluth, one-story frame and stucco stores with full concrete basement, hot-air heat, pine-finished floors cost (1930) 28¢ per cu. ft. Two-story frame and stucco stores with apartments above, having hot-air heat, pine finish and floors cost 23¢ per cu. ft. An allowance of 1½ per cent annual physical depreciation is made.

In New York City a Harlem and Bronx two-story "taxpayer" store building cost (1927) from 39 to 41¢ per cu. ft. Cheaply constructed one-story store buildings cost from 26½ to 34¢ per cu. ft., and average construction one-story stores cost 34 to 45½¢ per cu. ft.

In San Francisco average construction two-story store buildings with apartments above cost (1925) 37¢ per cu. ft. One-story store buildings cost from 20 to 25¢ per cu. ft.

The cost (1930) of store buildings in St. Paul is given in the table below.

TABLE 84.—ST. PAUL (1930)—STORE BUILDINGS

Description	Cost cu. ft. cents							
	Frame	Stucco on frame	Common brick	Conc. block	Brick veneer on frame	Stucco on tile	Pressed brick	Reinf. conc.
1 story and basement, modern, hot air	10 to 14	11 to 15	14 to 19	13 to 18	13 to 18	14 to 19	15 to 20	16 to 25
2 story and basement, stores 1st floor, apts. 2d floor	15 to 21	16 to 22	17 to 24	16 to 23	17 to 24	17 to 24	18 to 25	20 to 28
3 or 4 story and basement, stores 1st floor, apts. 2d, 3d, and 4th floors	.....	.....	22 to 28	.....	.....	23 to 29	24 to 30	26 to 36

NOTE.—For physical depreciation table see Table 33.

In Milwaukee (1930) one-story brick store buildings with basement cost 25¢ per cu. ft. and one-story brick store buildings without basement cost 27¢ per cu. ft. Two-story and basement modern frame store buildings with apartments above cost 27¢ per cu. ft. and the same built of brick veneer cost 30¢ per cu. ft. Two- and three-story brick, modern, store buildings with apartments above cost 33 to 37¢ per cu. ft. and fire-resisting store and apartment buildings cost 40¢ per cu. ft.

In Cincinnati (1930) modern, fire-resisting, good constructed, retail store buildings cost 35¢ per cu. ft.; modern, fire-resisting, average constructed stores, 30¢ per cu. ft. Good constructed, ordinary type buildings cost 25¢ per cu. ft. Average constructed, ordinary type buildings cost 20¢ per cu. ft.

The Los Angeles assessor uses the following cost factors for store buildings:

TABLE 85.—LOS ANGELES (1930)—STORE BUILDINGS

Description	Cost sq. ft.			
	Poor	Aver.	Good	Special
Frame store buildings	$0.75	$1.00	$1.25	
Brick store buildings	1.50	1.75	2.00	$2.25

Department Store Buildings.—Department stores are generally built from five to eight stories in height. The transfer of large volumes of freight and passengers is not considered to be economical for buildings in excess of eight stories in height.

Among the recent developments in department store construction we find greatly improved heating, lighting and ventilating systems, escalators for the rapid movement of passengers from one floor to another, airplane landings on the roof, roof gardens and dining rooms, roof display rooms, expensive store fronts and settings, arcaded walkways and loading platforms, automatic sprinkler systems and expensive fixtures and trim. The following tables give the cost of department store buildings in various cities of the United States:

TABLE 86.—DENVER (1930)—DEPARTMENT STORE BUILDINGS
Classification No. 11

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Base-ment	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	28	31	34	40	55	70	2.5	1.8	1.4	2 or more	Full	Conc. or softwood	Sales-rooms	Brick or conc.

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, plaster fin.	None	Flat	Softwood	Steam	T. W. each flr.	Pass. & frt. elevator	Non-fire resisting

FIG. 42.—Denver department store building, brick A.
NOTE.—See Table 86.

TABLE 87.—CLEVELAND (1930)—DEPARTMENT STORES[1]

No.	Description	Cost cu. ft. cents
1	6 story and full basement, steel frame, 2 ornamental terra cotta facades, designed to carry 2 additional stories, automatic sprinkler system, steam heat, first floor marble, upper floors hardwood, all undivided space, 12,680,000 cu. ft.	29
2	6 story and full basement, steel frame, first floor marble, other floors concrete, 3 elevators, no automatic sprinkler system, brick and terra cotta front, steam heat, all floors undivided space, 1,135,386 cu. ft.	30
3	5 story and full basement, steel frame, terra cotta front and side, elevators, well constructed, steam heat, all floors undivided space, 4,129,000 cu. ft.	31
4	5 story and full basement, steel frame, concrete floors, ornamental terra cotta front, 3 elevators, automatic sprinkler system, steam heat, all floors undivided space, 1,491,057 cu. ft.	33
5	4 story and full finished basement, concrete floors, face brick with terra cotta trim on front and side, second floor only divided into offices, steam heat, 995,924 cu. ft.	34

[1] From Zangerle's "Principles of Real Estate Appraising."

TABLE 88.—PORTLAND, ORE. (1926)—DEPARTMENT STORES

Description	Cost cu. ft., cents
12 stories, steel frame, basement and sub-basement, terra cotta finish on 3 sides, high-class construction, 14 elevators, steam heat, all floors undivided space.	48

For 1930 costs deduct 5% to 10%.

In Boston steel frame construction, full basement department stores cost 50¢ per cu. ft. (1927) as reported by W. R. Evans, Boston banker.

John E. Parsons, realtor, states that the average cost of large retail stores in American cities in 1925 was 35¢ per cu. ft. The average cost of department stores (1928) in Detroit was 38¢ per cu. ft. New York mill type construction department stores with heavy floors cost (1928) from 45½ to 60¢ per cu. ft. The 1930 cost of department stores in St. Paul is given in Table 89.

TABLE 89.—ST. PAUL (1930)—DEPARTMENT STORES

Description	Cost cu. ft., cents						
	Com. brick	Conc. block	Face brick	Mill const.	Protected const.	Reinf. conc.	Steel frame
2- to 4-stories, all floors open and finished; finished basement.	12 to 18	11 to 16	13 to 19	14 to 20	16 to 20	16 to 26	18 to 30
5 to 8 stories; all floors open and finished; finished basement.	13 to 19	.....	14 to 20	15 to 21	17 to 22	18 to 27	20 to 32

Milwaukee old-style brick department stores cost (1930) 30¢ per cu. ft. and new, modern, fire-resisting department store buildings cost from 45 to 50¢ per cu. ft.

The Manufacturers Appraisal Co. reports that the cost (1927) of Class A fire-resisting Chicago department store buildings varies from 50 to 70¢ per cu. ft.; Class B non-fire-resisting department stores from 30 to 50¢ per cu. ft.

Allen E. Beals, of the Dow Service, New York City, gives the cost of an eight-story steel and stone department store building, May, 1929, at 61¢ per cu. ft.

FIG. 42.—Denver department store building, brick A.
NOTE.—See Table 86.

TABLE 87.—CLEVELAND (1930)—DEPARTMENT STORES[1]

No.	Description	Cost cu. ft. cents
1	6 story and full basement, steel frame, 2 ornamental terra cotta facades, designed to carry 2 additional stories, automatic sprinkler system, steam heat, first floor marble, upper floors hardwood, all undivided space, 12,680,000 cu. ft.	29
2	6 story and full basement, steel frame, first floor marble, other floors concrete, 3 elevators, no automatic sprinkler system, brick and terra cotta front, steam heat, all floors undivided space, 1,135,386 cu. ft.	30
3	5 story and full basement, steel frame, terra cotta front and side, elevators, well constructed, steam heat, all floors undivided space, 4,129,000 cu. ft.	31
4	5 story and full basement, steel frame, concrete floors, ornamental terra cotta front, 3 elevators, automatic sprinkler system, steam heat, all floors undivided space, 1,491,057 cu. ft.	33
5	4 story and full finished basement, concrete floors, face brick with terra cotta trim on front and side, second floor only divided into offices, steam heat, 995,924 cu. ft.	34

[1] From Zangerle's "Principles of Real Estate Appraising."

TABLE 88.—PORTLAND, ORE. (1926)—DEPARTMENT STORES

Description	Cost cu. ft., cents
12 stories, steel frame, basement and sub-basement, terra cotta finish on 3 sides, high-class construction, 14 elevators, steam heat, all floors undivided space.	48

For 1930 costs deduct 5% to 10%.

In Boston steel frame construction, full basement department stores cost 50¢ per cu. ft. (1927) as reported by W. R. Evans, Boston banker.

John E. Parsons, realtor, states that the average cost of large retail stores in American cities in 1925 was 35¢ per cu. ft. The average cost of department stores (1928) in Detroit was 38¢ per cu. ft. New York mill type construction department stores with heavy floors cost (1928) from 45½ to 60¢ per cu. ft. The 1930 cost of department stores in St. Paul is given in Table 89.

TABLE 89.—ST. PAUL (1930)—DEPARTMENT STORES

Description	Cost cu. ft., cents						
	Com. brick	Conc. block	Face brick	Mill const.	Protected const.	Reinf. conc.	Steel frame
2- to 4-stories, all floors open and finished; finished basement	12 to 18	11 to 16	13 to 19	14 to 20	16 to 20	16 to 26	18 to 30
5 to 8 stories; all floors open and finished: finished basement	13 to 19	.....	14 to 20	15 to 21	17 to 22	18 to 27	20 to 32

Milwaukee old-style brick department stores cost (1930) 30¢ per cu. ft. and new, modern, fire-resisting department store buildings cost from 45 to 50¢ per cu. ft.

The Manufacturers Appraisal Co. reports that the cost (1927) of Class A fire-resisting Chicago department store buildings varies from 50 to 70¢ per cu. ft.; Class B non-fire-resisting department stores from 30 to 50¢ per cu. ft.

Allen E. Beals, of the Dow Service, New York City, gives the cost of an eight-story steel and stone department store building, May, 1929, at 61¢ per cu. ft.

CHAPTER XIII

OFFICE, LOFT AND FRATERNAL BUILDINGS

Office Building Classification.—In the classification of office buildings for purposes of assessment, they may be divided into four groups as follows:

1. Brick bearing wall type.
2. Mill type, cast-iron columns.
3. Steel frame type.
4. Reinforced concrete type.

The first large office buildings were a brick bearing wall type in which the roof, floor and wall loads were supported by exterior and interior brick bearing walls extending the full height of the building. This type of building was constructed between 1880 and 1900.

The mill type of office building was built from 1890 to 1910, approximately. In this type of building the loads are transmitted to cast-iron columns which permits a more spacious interior.

The steel frame type of office building came into existence about 1900. In this type all roof, floor and exterior wall loads are supported by the skeleton steel frame. Rolled structural members riveted together on the job take the place of cast-iron columns and beams.

Since 1918 reinforced concrete office buildings have been constructed in which all floors, roofs and columns are monolithic concrete reinforced with steel.

Office Building Construction.—The most noted recent development in office buildings is the pyramid offset type of construction which has been brought about by the demand for higher buildings with a maximum of light and air. The irregular broken roof line of this type of building is a diversion from the former square block type of office building. The central tower type of building is also being constructed, where the tower of small relative area arises from the lower part of the building of comparatively much larger area. This type of building probably is designed for

advertising purposes, or as a monument to the memory of the builder and is seldom a practical economically arranged and efficiently operated office building.

Although reinforced concrete office building construction has come into general use, we find that steel-frame office buildings are favored by many architects and engineers. Each type has its own adherents and supporters with persuasive and convincing arguments favoring one or the other of the two types of construction.

Modern office buildings are efficiently arranged and operated because the whole subject of design and construction has been intensely studied by national engineering and architectural organizations as well as national associations of realtors, building owners and managers and investment bankers. Expert advice and consultation is available relative to these matters.

Among the noted improvements in office building construction are the following: high-speed, automatic self-adjusting safety elevators; small amount of waste space in halls and lobbies; steel-frame doors and windows; improved ventilating and heating systems; easily removable partitions regulating the floor space required; lower ceilings; larger window areas; soundproof and fireproof construction; communication conveniences; well-lighted offices; full utilization of ground-floor space; airplane landings and display spaces on the roof.

The cost of office buildings in Cleveland is given in Table 90.

TABLE 90.—CLEVELAND (1930)—OFFICE BUILDINGS[1]

Description	Cost cu. ft., cents
Well-built office building containing stores on first floors, offices on upper floors, 4 stories and full basement, steel frame, concrete floors, terra cotta front, 460,636 cu. ft.	45
Well-built steel-frame office building with limestone front, interior lots, costly detailed interior and exterior, 8 stories and designed to carry 6 more stories, 2,732,982 cu. ft.	48
14-story, steel-frame, fire-resisting office building, exterior walls of shale brick trimmed with terra cotta, interior woodwork of mahogany and oak, 1,819,211 cu. ft.	60

[1] From Zangerle's "Principles of Real Estate Appraising."

In Portland, Ore., a good constructed, 10-story office building, reinforced concrete, cost 63¢ per cu. ft. (1926). The 3 lower stories have terra-cotta trim and the remainder face brick. The main floor is occupied by retail stores. The floors are reinforced concrete and the building has five elevators and is steam heated. The plumbing is first class with tiled toilets.

Another Portland office building 12 stories in height, steel-frame construction with the lower 4½ stories occupied by a department store and the remainder of the building in offices, cost 48¢ per cu. ft. It has a full basement, imitation hardwood interior finish, large light court in center of the building, steam heat, 4 elevators, 1,720,000 cu. ft.

Referring the cost of Omaha office buildings, as given by Arthur in his "Appraisers' and Adjusters' Handbook," to present-day costs, we find that the average cost of first-class office buildings is 63½¢ per cu. ft. and second-class masonry wall and wood joist office buildings 44½¢ per cu. ft.

Class A office buildings in San Francisco cost (1925) 58¢ per cu. ft. and Class B office buildings 54¢ per cu. ft. A doctors and dentists office building cost 61¢ per cu. ft.

A 20-story side street Manhattan office building built of steel, concrete and brick cost 65¢ per cu. ft. The 1928 reproduction cost of the 60-story Woolworth building would be about $1.25 per cu. ft. and for the 39-story Bankers Trust building about $1.40 cu. ft. A New York main street type of office building with stores built of steel, stone and brick cost (1929) 56¢ per cu. ft. The *New York Evening Post* type (difficult foundation) of steel, stone and brick 16-story office building cost (1929) 73¢ per cu. ft. The 40-story Chanin building type main building cost 65¢ per cu. ft. and the steel tower (heavy wind bracing) cost 75 to 80¢ per cu. ft. (1929). The 39-story new Fuller building type cost (1929) $1 per cu. ft. These figures are furnished largely through the courtesy of Allen E. Beals of the Dow Service, New York, N. Y.

TABLE 91.—DENVER (1930)—OFFICE BUILDINGS
Classification No. 12

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Ext. walls	Ext. trim	Int. const.	Partitions	Lobby & halls	Stairs	Plumbing	Size of rooms	Remarks
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good										
Brick bearing wall A	21 to 25			65			...	1.5	...	2 to 4	Brick	Brick	Wood	Lath & plaster	Wood	Wood	Ordinary	Large	Non-fire resisting
" " " B	24 to 29			"			...	"	...	2	"	"	Wood & tile	"	Tile or marble	Metal	"	Medium	"
" " " C	29 to 34			"			...	"	...	2 to 8	Brick or stone	Stone or T. C.	"	"	Wood	"	"	Large	"
" " " D	36 to 38			"			...	"	...	3	Brick	Brick & stone	Wood & marble	"	"	Wood Metal & stone	Marble lavatories	"	"
" " " E	85			"			...	"	...	9	"	Brick or stone	C. I. columns steel beams	Metal lath	Tile & marble	Metal	Ordinary	"	Semi-fire resisting
Mill type A	24 to 33			70			...	1.4	...	3 to 7	Brick or stone	Brick or stone	Wood	Lath & plaster	Wood	Metal	"	"	"
" " B	27 to 33			"			...	"	...	4 to 6	"	Stone	Wood & marble	"	"	Wood	"	Medium	Non-fire resisting
" " C	35 to 38			"			...	"	...	5 to 8	"	Brick or stone	C. I. columns steel beams	"	Tile or marble	Metal	Tile lavatories	Large	Semi-fire resisting
" " D	43			"			...	"	...	5 to 9	"	Stone	wood firs.	"	Marble onyx tile	"	Tile lavatories	Medium	"
Steel frame A	27 to 29			75			...	1.3	...	3 to 6	Brick	Brick	Steel beams wood firs.	Metal lath or tile	Wood & tile	"	Ordinary	"	"
" " B	33 to 40			"			...	"	...	5 to 9	"	Brick or stone	"	"	"	"	Tile lavatories	"	"
" " C	38 to 43			"			...	"	...	4 to 12	"	Brick or T. C.	Steel beams conc. firs.	"	Tile or marble	"	Tile or marble lavatories	"	Fire resisting
" " D	48 to 58			"			...	"	...	9 to 12	Brick or granite	Tile or T. C.	Steel beams conc. firs. metal trim & floors	"	Marble	Metal or stone	Marble lavatories water in offices	"	"
Reinforced conc. A	28 to 38			"			...	"	...	4 to 8	Brick	"	Rein. conc. wood firs.	"	Tile	Metal	Ordinary	"	Semi-fire resisting
" " B	38 to 43			"			...	"	...	4 to 12	Brick, stone or T. C.	Brick, stone or T. C.	Rein. conc. conc. floors	"	Tile or marble	"	Tile or marble lavatories	"	Fire resisting

FIG. 43.—Denver office building—brick bearing wall type.
NOTE.—See Table 91.

The average cost (1927) of Boston office buildings was 53¢ per cu. ft. The Associated General Contractors of Los Angeles report the 1927 cost of Class A steel-frame office buildings to be from 50 to 70¢ per cu. ft., Class A reinforced concrete office buildings from 45 to 65¢ per cu. ft.

Harry Cutmore of the Manufacturers Appraisal Co., Chicago, states that the good constructed, first-class, fire-resisting office

FIG. 44.—Denver office building—reinforced concrete type.
NOTE.—See Table 91.

buildings cost (1927) from 65 to 85¢ per cu. ft.; ordinary construction fire-resisting office buildings from 40 to 60¢ per cu. ft.; and cheaply constructed non-fireproof office buildings from 25 to 45¢ per cu. ft. Gordon Strong and Co. state that Chicago fire-resisting office buildings cost (1927) from 55 to 75¢ per cu. ft. Table 91 gives the cost of Denver office buildings.

The average cost of Boston office buildings is 53¢ per cu. ft. J. E. Parsons, realtor, reports that the general average cost of small office buildings erected in the United States in 1925 was 45¢ per cu. ft. and large office buildings 57¢ per cu. ft.

The Detroit assessor estimates the 1930 cost of fire-resisting office buildings from 40 to 65¢ per cu. ft. and ordinary con-

FIG. 43.—Denver office building—brick bearing wall type.
NOTE.—See Table 91.

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FIG. 44.—Denver office building—reinforced concrete type.
NOTE.—See Table 91.

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struction office buildings from 30 to 55¢ per cu. ft. Robert R. Volk, president of the Board of Tax Commissioners of Trenton, N. J., states that the average cost (1928) of office buildings is 85¢ per cu. ft.

W. N. Bowman, Denver architect, states that first-class constructed fire-resisting buildings cost from 45 to 90¢ per cu. ft.

FIG. 45.—Denver office building—steel frame type.
NOTE.—See Table 91.

and non-fireproof ordinary constructed office buildings from 30 to 45¢ per cu. ft.

The Owen-Ames-Kimball Co. of Grand Rapids, Mich., states that office buildings which they have constructed (1926) which are 15 stories high, approximately 80 ft. square, fire-resisting construction throughout, terra cotta front, marble wainscot corridors, terrazo corridor floors, including lighting, heating, power wiring and elevators cost 60 to 70¢ per cu. ft. The

Canadian Pacific Railway office building in Toronto, Can., which is 15 stories high, steel-frame construction, fire-resisting, reinforced concrete floors, glazed terra cotta and face-brick exterior walls and terra cotta interior partitions cost 65¢ per cu. ft. in 1913 (approximately $1.30 per cu. ft. in 1930).

The 10-story Atchison Topeka and Santa Fe Railway office building in Topeka, Kan., cost 45¢ per cu. ft. It is built of

FIG. 46.—Denver office building—steel frame type.
NOTE.—See Table 91.

reinforced concrete with terra-cotta facing. Other 12-story office buildings erected by the same company in Texas cost 52¢ per cu. ft.

The assessor of Atlanta, Ga., states that first-class fire-resisting office buildings cost (1928) from 40 to 60¢ per cu. ft.

New York City brick and stone office buildings of ordinary or mill-type construction cost (1928) 42½ to 57¢ per cu. ft. for

struction office buildings from 30 to 55¢ per cu. ft. Robert R. Volk, president of the Board of Tax Commissioners of Trenton, N. J., states that the average cost (1928) of office buildings is 85¢ per cu. ft.

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New York City brick and stone office buildings of ordinary or mill-type construction cost (1928) 42½ to 57¢ per cu. ft. for

average construction and from 57 to 71¢ per cu. ft. for good construction. For fire-resisting office building construction in New York City the cost (1928) was from 71¢ to $1 for average construction and from $1.00 to $1.70 per cu. ft. for good construction.

The average cost (1930) of ordinary and mill-type constructed store and office buildings in Milwaukee is 30¢ per cu. ft. and for fire-resisting good construction store and office buildings from 45 to 50¢ per cu. ft. The average cost of 1928 reinforced concrete office buildings in Birmingham is 56¢ per cu. ft. and for steel-frame office buildings 62¢ per cu. ft.

Table 92 gives the cost of office buildings in St. Paul.

TABLE 92.—ST. PAUL (1924)—OFFICE BUILDINGS

Description	Cost cu. ft., cents
Ordinary brick construction	16 to 24
Brick, mill-type construction	19 to 28
Modern, fire-resisting reinf. conc. construction	30 to 50
Modern, steel-frame construction	33 to 55

The Cincinnati assessor has furnished data on the cost of office buildings as shown in Table 93:

TABLE 93.—CINCINNATI (1930)—OFFICE BUILDINGS

Class	Description	Cost cu. ft., cents
A-1	Concrete and steel frame, fire-resisting, modern, stone and terra-cotta front, tile floors, marble wainscoting, elevators, hardwood or metal trim	55
A-2	Concrete or steel frame, fire-resisting, less expensive exterior or interior equipment and finish	50
A-3	Concrete or steel frame, fire-resisting, economical design and construction, plain and inexpensive exterior and interior	45
B-1	Semi-fire resisting, unprotected steel-frame or mill type construction	40
C	Non-fire resisting	35
D	Non-fire resisting, ordinary type construction	30

Loft Building Construction.—Loft buildings are generally five or more stories in height with but few interior partitions. They are more cheaply constructed and finished than office or department store buildings and are used largely by jobbers, manufacturers and other business concerns requiring considerable undivided floor space. We find this type of building in a few of the larger cities of the country.

Class A loft buildings in San Francisco cost (1925) 25¢ per cu. ft. and Class B loft buildings 22¢ per cu. ft. In New York City a side street loft building cost (1926) from 44 to 46¢ per cu. ft. A Brooklyn show room and loft building cost (1927) 39¢ per cu. ft.

W. Evans states that the cost of the average loft building in Boston (1927) was 46¢ per cu. ft. The cost of loft buildings in Los Angeles (1927) as reported by the Associated General Contractors is 20 to 35¢ per cu. ft. for Class A steel-frame lofts, 17 to 30¢ for Class A reinforced concrete lofts and 17 to 30¢ for Class C brick lofts. The Manufacturers Appraisal Co. reports the 1927 cost of Chicago Class A fire-resisting good construction loft buildings to vary from 35 to 55¢ per cu. ft., Class B mill-type construction lofts from 25 to 35¢ per cu. ft. and Class C ordinary construction lofts from 15 to 25¢ per cu. ft.

In New York City cheaply constructed non-fireproof loft buildings cost (1926) from 28½ to 34¢ per cu. ft., ordinary constructed non-fireproof lofts from 34 to 45¢ per cu. ft. and mill-type lofts with heavy floors from 45½ to 57¢ per cu. ft. Modern first-class construction fire-resisting loft buildings cost 57¢ to $1 per cu. ft. The 15-story Eaves building type cost (1929) 51¢ per cu. ft. In Cincinnati (1930) the assessor applies the following cost figures to loft buildings:

TABLE 94.—CINCINNATI (1930)—LOFT BUILDINGS

Class	Description	Cost cu. ft., cents
A-1	Fire-resisting, semi-office, modern, plastered, good construction	32
A-2	Fire-resisting, modern, open floors, good construction	30
A-3	Fire-resisting, modern, open floors, average construction	25
B-1	Mill-type construction, modern, average construction	20
C	Ordinary type, cheap construction	18

Fraternal Building Construction.—Buildings constructed primarily for the purpose of meeting the needs of fraternal organizations vary considerably in the character of construction. Some are used entirely for fraternal purposes, whereas others are partially occupied by stores or offices.

Because of the large open spaces given over to lodge rooms, dance halls, gymnasiums, etc., the cost per cubic foot of this type of building will vary from office, bank or store buildings of similar construction.

Table 95 gives the cost of fraternal buildings in Denver.

TABLE 95.—DENVER (1930)—FRATERNAL BUILDINGS
Classification No. 19

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Base-ment	Base-ment floor	Base-ment finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	28	32	36	50	55	65	2	1.8	1.5	2 or more	Full	Conc.	None	Brick or conc.
Stone A	40	44	48	80	100	120	1.25	1	0.8	"	"	"	Kitchen restroom	Brick, stone conc.

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, plaster fin.	None	Flat	Softwood	Steam	S. T. W. each floor	Kitchen cabinet	Non-fire resisting
Stone A	Stone walls, plaster fin.	"	"	Hardwood	"	"	"	Semi-fire resisting

FIG. 47.—Denver fraternal building, brick A.
NOTE.—See Table 95.

CHAPTER XIV

BANK AND THEATER BUILDINGS

Bank Building Construction.—Bank buildings are generally the most expensive type of commercial structure because of their classic stone and marble fronts and rich and costly exterior and interior finish and decorations. Massive, burglar-proof vaults, soundproof and fireproof construction mark recent bank construction progress.

The elimination of tellers cages by the substitution of a high counter is also a recent development. Any commercial building in which more than 50 per cent of the floor space is used for banking purposes may be classified as a bank building.

Table 96 gives the Denver (1930) cost of bank buildings. In New York City bank buildings cost (1928) from $1.00 to $1.70 per cu. ft. The Colorado National Bank building (Fig. 48) cost $1 per cu. ft. It has a full basement, marble front, marble facade, massive vaults, mural interior decorations, tile and marble finish, bronze tellers cages, etc., and is of steel-frame fire-resisting construction.

L. F. Dow gives the cost of New York suburban stone faced bank buildings at 90¢ per cu. ft. (1927). Chicago banks cost (1928) from 50 to 90¢ per cu. ft. W. N. Bowman, Denver architect, states that bank buildings cost from 45 to 90¢ per cu. ft. John Zangerle, of Cleveland, states that the First National Bank building of that city cost (1924) 40¢ per cu. ft. This is a steel-frame building with ornamental granite facade, banking rooms in basement and first floor. All finished in ornamental marble and stucco. It has two large fireproof vaults. The building is three stories high and has two elevators. Table 97 gives the figures used by the Cincinnati assessor in appraising bank buildings (1930).

FIG. 47.—Denver fraternal building, brick A.
NOTE.—See Table 95.

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TABLE 96.—DENVER (1930)—BANK BUILDINGS

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Stone A	75	85	95	65	85	100	1.5	1.25	1	2 or more	Full	Conc.	Vaults	Stone or brick

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Stone A	Brick walls, plaster fin.	None	Flat	H. W. or tile	Steam	T. W. each floor	None	Fire resisting

FIG. 48.—Denver bank building, stone A.
NOTE.—See Table 96.

TABLE 97.—CINCINNATI (1930)—BANK BUILDINGS

Class	Description	Cost cu. ft., cents
A-1	One story fire-resisting, good const	40
A-2	" " " ordinary type, average const.	35
B-1	Ordinary type, good const	30
B-2	" " aver. const	25

Theater Building Construction.—The construction of theater buildings is more varied than that of any other type of commercial building. In developing a theater classification for any city, it is well to designate each classification by the name of a specific theater, which will enable the appraiser to determine the classification of other theaters of similar type and construction.

Among the recent developments in theater building construction are the following: air-cooling and ventilating systems; improved lighting systems; the installation of equipment for talking movies; expensive and attractive exterior and interior decorations; disappearing orchestra pits and organ consoles;

TABLE 96.—DENVER (1930)—BANK BUILDINGS

Class	Cost cu. ft., cents		Life, years		Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good						
Stone A	75	85	95	65	85	100	1.5	1.25	1	2 or more	Full	Conc.	Vaults	Stone or brick

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Stone A	Brick walls, plaster fin.	None	Flat	H. W. or tile	Steam	T. W. each floor	None	Fire resisting

FIG. 48.—Denver bank building, stone A.
NOTE.—See Table 96.

TABLE 97.—CINCINNATI (1930)—BANK BUILDINGS

Class	Description	Cost cu. ft., cents
A-1	One story fire-resisting, good const	40
A-2	" " " ordinary type, average const.	35
B-1	Ordinary type, good const.	30
B-2	" " aver. const.	25

Theater Building Construction.—The construction of theater buildings is more varied than that of any other type of commercial building. In developing a theater classification for any city, it is well to designate each classification by the name of a specific theater, which will enable the appraiser to determine the classification of other theaters of similar type and construction.

Among the recent developments in theater building construction are the following: air-cooling and ventilating systems; improved lighting systems; the installation of equipment for talking movies; expensive and attractive exterior and interior decorations; disappearing orchestra pits and organ consoles;

mechanical scenery shifting and stage setting devices; improved exit and fire escape facilities; fireproof and soundproof construction; development of acoustics and improved picture-machine booths.

Cost of Theater Buildings.—The four-story Broadway type of theater in New York City cost (1927) 50 to 62¢ per cu. ft. This has a terra-cotta front. The store facade mid-Manhattan type cost (1927) 65¢ per cu. ft. Brooklyn moving picture theaters cost (1927) 48 to 50¢ per cu. ft. The four-story Century type (New York) of stone and steel cost (1929) 65¢ per cu. ft.

Cheaply constructed Duluth theaters cost (1930) 25¢ per cu. ft. Concrete fire-resisting motion picture theaters in Minneapolis cost (1927) 18 to 24¢ per cu. ft.

Chicago Class A theaters cost (1927) 45 to 65¢ per cu. ft., Class B theaters 25 to 45¢ per cu. ft. and Class C theaters from 15 to 25¢ per cu. ft. Detroit first-class, fire-resisting theaters cost (1928) 35¢ per cu. ft. and second-class theaters 26½¢ per cu. ft. Moving picture theaters in Milwaukee cost (1926) from 25 to 35¢ per cu. ft., which does not include the picture machines, organ or equipment.

A Cleveland moving picture theater containing 759 seats costs $6 per sq. ft. according to John Zangerle. This contains two stores and has a face-brick finish, flat tar and gravel roof, steam heat, two toilet rooms in the theater and two plumbing fixtures in each store. The seating and the organ are not included in the cost. The building has 10,000 sq. ft. of ground floor area.

The cost of theater buildings in certain other cities is shown in the following tables:

TABLE 98.—CINCINNATI (1930)—THEATER BUILDINGS

Class	Description	Cost cu. ft., cents
A-1	Modern, fire-resisting, highest type const	55
A-2	" " " average const	45
A-3	" " " cheap const	40
B-1	Ordinary type, modern, good const	30
B-2	" " average const	20

TABLE 99.—PORTLAND, ORE. (1926)—THEATER BUILDINGS

Class	Description	Cost cu. ft., cents
1	Steel frame const., face brick and terra-cotta front, concrete and tile floors, finished in marble and hardwood	50 to 60
2	Reinforced concrete const., face brick and terra-cotta front, concrete and tile floors, finished in marble and hardwood, steam heat, average const	42 to 48
3	Ordinary brick type const., fir finish, steam heat	25 to 30

For 1930 deduct 6 to 10%.

TABLE 100.—DENVER (1930)—THEATER BUILDINGS

Classification No. 16

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	18	22	26	30	40	50	3.3	2.5	2	1	None	None	None	Brick or conc.
" B	20	24	28	30	40	50	3.3	2.5	2	1 & balcony	Full	Conc.	"	Conc.
" C	28	32	36	40	50	55	2.5	2	1.8	2 or more	"	"	Rest-rooms	Brick or conc.
" D	32	36	40	50	65	75	2	1.5	1.3	1 & balcony	"	"	Full	Conc.
" E	37	41	45	40	50	55	2.5	2	1.8	2 or more	"	"	Rest-rooms	Brick or conc.

TABLE 100.—DENVER (1930)—THEATER BUILDINGS.—(*Continued*)

Class	Finish	Porches	Roof	Floors	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, plaster fin.	None	Flat	Softwood	Steam	T.	None	Non-fire resisting, suburban type
" B	Brick walls, plaster fin.	"	"	Wood or conc.	"	2 rest-rooms	"	Semi-fire resisting, Aladdin type
" C	Brick walls, plaster fin.	"		Wood, conc. & tile	"	2 T. & W.	"	Semi-fire resisting, Curtis St. type
" D	Brick walls, ornamental plaster fin.	"	"	Conc.	"	2 or more rest-rooms	"	Denver type fire resisting
" E	Brick walls, plaster fin.	"	"	Wood, tile, conc.	"	2 T. & W.	"	Semi-fire resisting, Broadway type

NOTE.—Brick E, Broadway type, has large stage, dressing rooms, elaborate lobby and decorations.

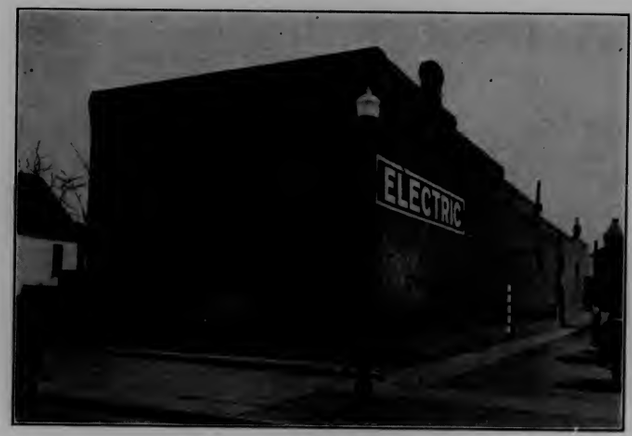

FIG. 49.—Denver theater building, brick A.
NOTE.—See Table 100.

FIG. 50.—Denver theater building, brick C.
NOTE.—See Table 100.

CHAPTER XV

FACTORY AND WAREHOUSE BUILDINGS

Factory Building Construction.—Improvements in factory building construction have kept pace with the development of industry. Some of the factors characterizing modern factory buildings are fireproof construction, improved lighting, heating and ventilating systems, efficient arrangement of labor-saving machinery, installation of safety devices, construction of ramps, efficient arrangement of units with view to future expansion, introduction of saw-tooth roof and large glassed wall areas, automatic sprinkler systems, insulated floors, walls and roof and efficient material handling facilities.

FIG. 49.—Denver theater building, brick A.
NOTE.—See Table 100.

FIG. 50.—Denver theater building, brick C.
NOTE.—See Table 100.

CHAPTER XV

FACTORY AND WAREHOUSE BUILDINGS

Factory Building Construction.—Improvements in factory building construction have kept pace with the development of industry. Some of the factors characterizing modern factory buildings are fireproof construction, improved lighting, heating and ventilating systems, efficient arrangement of labor-saving machinery, installation of safety devices, construction of ramps, efficient arrangement of units with view to future expansion, introduction of saw-tooth roof and large glassed wall areas, automatic sprinkler systems, insulated floors, walls and roof and efficient material handling facilities.

TABLE 101.—DENVER (1930)—FACTORY BUILDINGS
Classification No. 21

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	7	9	11	20	25	30	5	4	3.3	1	None	None	None	Brick or conc.
" B	9	11	13	30	40	50	3.3	2.5	2	1	"	"	"	"
" C	12	14	16	40	50	55	2.5	2	1.8	1 or more	Small	Conc.	"	"
" D	20	23	26	40	50	55	2.5	2	1.8	2 or more	Full	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, no inside fin.	None	Flat	Dirt	None	T.	None	Non-fire resisting
" B	" " "	"	"	Softwood or conc.	Stove	T.	"	"
" C	Brick walls, office fin.	"	"	Conc.	Steam	T. W.	1 elevator	Fire resisting
" D	" " "	"	"	"	"	"	"	Face brick or tile trim, fire resisting

NOTE.—For cold storage rooms add costs per square foot of wall area insulated as given in Table 102.

FIG. 51.—Denver factory building, brick B.
NOTE.—See Table 101.

FIG. 52.—Denver factory building, brick C.
NOTE.—See Table 101.

TABLE 102.—COST OF INSULATED WALLS PER SQ. FT.

	Material		1" thick		3" thick insulex
	Balsam wool	Celotex	Sheet cork	Ground cork	
Material	$0.05	$0.09	$0.09	$0.05	$0.08
Labor	0.02	0.02	0.02	0.02	0.02
Plaster	0.14	0.14	0.14	0.14	0.14
Total	0.21	0.25	0.25	0.21	0.24

NOTE.—Insulex 3 in. thick gives the same degee of insulation as 1 in. of other materials, shown in above table
No extra charge for sawdust insulation.

TABLE 101.—DENVER (1930)—FACTORY BUILDINGS
Classification No. 21

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	7	9	11	20	25	30	5	4	3.3	1	None	None	None	Brick or conc.
" B	9	11	13	30	40	50	3.3	2.5	2	1	"	"	"	"
" C	12	14	16	40	50	55	2.5	2	1.8	1 or more	Small	Conc.	"	"
" D	20	23	26	40	50	55	2.5	2	1.8	2 or more	Full	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, no inside fin.	None	Flat	Dirt	None	T.	None	Non-fire resisting
" B	" " "	"	"	Softwood or conc.	Stove	T.	"	"
" C	Brick walls, office fin.	"	"	Conc.	Steam	T. W.	1 elevator	Fire resisting
" D	" " "	"	"	"	"	"	"	Face brick or tile trim, fire resisting

NOTE.—For cold storage rooms add costs per square foot of wall area insulated as given in Table 102.

FIG. 51.—Denver factory building, brick B.
NOTE.—See Table 101.

FIG. 52.—Denver factory building, brick C.
NOTE.—See Table 101.

TABLE 102.—COST OF INSULATED WALLS PER SQ. FT.

	Material		1" thick		3" thick insulex
	Balsam wool	Celotex	Sheet cork	Ground cork	
Material	$0.05	$0.09	$0.09	$0.05	$0.08
Labor	0.02	0.02	0.02	0.02	0.02
Plaster	0.14	0.14	0.14	0.14	0.14
Total	0.21	0.25	0.25	0.21	0.24

NOTE.—Insulex 3 in. thick gives the same degee of insulation as 1 in. of other materials, shown in above table

No extra charge for sawdust insulation.

TABLE 103.—CLEVELAND (1930)—FACTORY BUILDINGS[1]

Description	1 story		2 or more stories	
	Cost, sq. ft.	Cost, cu. ft.	Cost, sq. ft.	Cost, cu. ft.
1 story, small basement, brick walls, steel trusses supporting wood sheathing, flat, tar and gravel roof, steel sash, concrete floor, steam heat, small amount of plumbing, 16,000 sq. ft. of floor area	$2.25	$0.12½		
2-story office section, 1-story factory, boiler room in small basement, face-brick front, remainder common brick, mill-type construction floors and flat roof, office, oak floors and finish, factory, concrete floors, steam heat, 3 toilets and 8 fixtures	3.30	0.18½	$9.00	$0.28½
Stucco and brick walls, 1-story factory section, 61′ × 180′, 2-story section 61′ × 20′. Steel-frame construction and steel-sash factory construction, maple floors throughout, mill-type construction roof, no basement, steam heat, 13 plumbing fixtures	3.00	0.17	9.00	0.28½
Modern fire-resisting factory building, reinforced concrete, pressed brick exterior except rear, large number of steel sash windows, cement finished floors, no basement, first to fourth floors undivided area except for offices, tiled hospital floor on first floor, steam heat, used for textile manufacturing, average amount of plumbing, automatic sprinkler system, 2,906,497 cu. ft.				0.19

NOTE.—Cubic foot cost computed by authors.

[1] From Zangerle's "Principles of Real Estate Appraising."

The cost of frame shops and factories in Milwaukee is from 8 to 10¢ per cu. ft. (1926) and for steel and reinforced concrete fire-resisting shops and factories the cost is 16¢ per cu. ft. These figures do not include heating, sprinkler system, plumbing, elevators or special equipment. Frame foundries and machine shops cost 7¢ per cu. ft., brick 10¢ per cu. ft. and steel and reinforced concrete fire-resisting construction 12¢ per cu. ft. This does not include any equipment.

FIG. 53.—Denver factory building, brick D.
NOTE.—See Table 101.

Table 104 gives the cost of factory buildings in St. Paul.

TABLE 104.—ST. PAUL (1930)—FACTORY BUILDINGS

Description	Cost cu. ft., cents						
	Brick	Conc. block	Solid press brick	Mill-type const.	Protected const.	Reinf. conc.	Steel frame
2 to 4 stories, rough unplastered walls, unfinished ceilings	10 to 15	10 to 15	11 to 16	13 to 18	14 to 18	14 to 19	
5 to 8 stories, rough unplastered walls, unfinished ceilings	11 to 16	.....	12 to 17	14 to 19	15 to 19	15 to 20	16 to 22

The Los Angeles assessor estimates factory buildings to cost (1927) 75¢ per sq. ft. for poor construction frame, $1 per sq. ft. for average construction frame and $1.25 per sq. ft. for good construction frame.

Cincinnati figures on factory buildings (1930) are given in Table 105.

TABLE 103.—CLEVELAND (1930)—FACTORY BUILDINGS[1]

Description	1 story		2 or more stories	
	Cost, sq. ft.	Cost, cu. ft.	Cost, sq. ft.	Cost, cu. ft.
1 story, small basement, brick walls, steel trusses supporting wood sheathing, flat, tar and gravel roof, steel sash, concrete floor, steam heat, small amount of plumbing, 16,000 sq. ft. of floor area	$2.25	$0.12½		
2-story office section, 1-story factory, boiler room in small basement, face-brick front, remainder common brick, mill-type construction floors and flat roof, office, oak floors and finish, factory, concrete floors, steam heat, 3 toilets and 8 fixtures	3.30	0.18½	$9.00	$0.28½
Stucco and brick walls, 1-story factory section, 61′ × 180′, 2-story section 61′ × 20′. Steel-frame construction and steel-sash factory construction, maple floors throughout, mill-type construction roof, no basement, steam heat, 13 plumbing fixtures	3.00	0.17	9.00	0.28½
Modern fire-resisting factory building, reinforced concrete, pressed brick exterior except rear, large number of steel sash windows, cement finished floors, no basement, first to fourth floors undivided area except for offices, tiled hospital floor on first floor, steam heat, used for textile manufacturing, average amount of plumbing, automatic sprinkler system, 2,906,497 cu. ft				0.19

NOTE.—Cubic foot cost computed by authors.

[1] From Zangerle's "Principles of Real Estate Appraising."

The cost of frame shops and factories in Milwaukee is from 8 to 10¢ per cu. ft. (1926) and for steel and reinforced concrete fire-resisting shops and factories the cost is 16¢ per cu. ft. These figures do not include heating, sprinkler system, plumbing, elevators or special equipment. Frame foundries and machine shops cost 7¢ per cu. ft., brick 10¢ per cu. ft. and steel and reinforced concrete fire-resisting construction 12¢ per cu. ft. This does not include any equipment.

FIG. 53.—Denver factory building, brick D.
NOTE.—See Table 101.

Table 104 gives the cost of factory buildings in St. Paul.

TABLE 104.—ST. PAUL (1930)—FACTORY BUILDINGS

Description	Cost cu. ft., cents						
	Brick	Conc. block	Solid press brick	Mill-type const.	Protected const.	Reinf. conc.	Steel frame
2 to 4 stories, rough unplastered walls, unfinished ceilings	10 to 15	10 to 15	11 to 16	13 to 18	14 to 18	14 to 19	
5 to 8 stories, rough unplastered walls, unfinished ceilings	11 to 16	.....	12 to 17	14 to 19	15 to 19	15 to 20	16 to 22

The Los Angeles assessor estimates factory buildings to cost (1927) 75¢ per sq. ft. for poor construction frame, $1 per sq. ft. for average construction frame and $1.25 per sq. ft. for good construction frame.

Cincinnati figures on factory buildings (1930) are given in Table 105.

TABLE 105.—CINCINNATI (1930)—FACTORY BUILDINGS

Class	Description	Cost cu. ft., cents
A-1	Fire-resisting, modern, good construction	25
A-2	" " " average construction	20
B-1	Mill-type construction	18
C	Ordinary type, cheap construction	15

L. F. Dow reports the cost (1927) of factory buildings in New York City as shown in Table 106.

TABLE 106.—NEW YORK CITY (1927)—FACTORY BUILDINGS

Description	Cost cu. ft., cents
Factory buildings, no automatic sprinklers, no elevators	24 to 27
Factory, mill-type construction, wood frame and corrugated iron sides	17 to 20
Factory, reinforced concrete, 3 stories	42
Factory, brick and reinforced concrete, 4 stories and elevator	46

San Francisco factories cost (1927) from 22¢ to 25¢ per cu. ft. Boston factories constructed of brick and stone with wood floors cost (1927) 20¢ per cu. ft. The Manufacturers Appraisal Co. reports the cost of Chicago factories as given in Table 107.

TABLE 107.—CHICAGO FACTORY BUILDINGS

Class	Description	Cost cu. ft., cents
A	Fire resisting	30 to 40
B	Mill-type construction	20 to 40
C	Ordinary type, cheap construction	15 to 25

The Detroit assessor has established the following 1930 costs of factory buildings:

TABLE 108.—DETROIT (1930)—FACTORY BUILDINGS

Description	Cost cu. ft., cents
Fire-resisting, under 300,000 cu. ft.	18 to 25
Mill-type construction, under 300,000 cu. ft.	15 to 22
Ordinary type cheap construction, brick	14 to 21
Frame	10 to 15

The average cost of 16 first-class reinforced concrete factory buildings deducted from figures given by William Arthur in his "Appraisers' and Adjusters' Handbook" is 25¢ per cu. ft. Table 109 gives the cost (1926) of Portland, Ore., factory buildings.

TABLE 109.—PORTLAND, ORE. (1926)—FACTORY BUILDINGS

Description	Cost sq. ft.
Good construction, brick or reinforced conc., elevators, fire-resisting, with automatic sprinkler system, concrete floors	$1.70 to 2.10
Average construction reinforced concrete, elevator, fire-resisting, no automatic sprinkler system, concrete floors	1.00 to 1.70
Frame construction, galvanized iron roof and walls, no basement, elevator	0.65 to 0.90
Frame construction, cheap, common siding, no elevator, dirt floor, no basement, non-fire-resisting construction	0.40 to 0.50

For 1930 cost deduct 6 to 10%.

Warehouse Building Construction.—During the past ten years the construction of reinforced concrete warehouses has grown in popular favor due largely to the fireproof qualities of this type of construction. The development of elevator facilities and cooling, heating and insulating systems has also been noteworthy during the past decade. Sprinkler systems are now largely used. Material handling, trackage, loading and unloading facilities are being constantly improved.

TABLE 110.—DENVER (1930)—WAREHOUSES
Classification No. 20

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	9	11	13	25	30	40	4	3.3	2.5	1	None	None	None	Brick or conc.
" B	13	15	17	50	55	65	2	1.8	1.5	1 or more	Full	Conc.	"	"
" C	20	23	26	65	70	80	1.5	1.4	1.25	1 or more	"	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, no inside fin.	None	Flat	Softwood or conc.	Stove	T.	None	Non-fire resisting
" B	Brick walls, office fin.	"	"	Softwood	Steam	T. W.	1 elevator	"
" C	"	"	"	Conc.	"	"	"	Fire resisting

FIG. 54.—Denver warehouse, brick B.
NOTE.—See Table 110.

FIG. 55.—Denver warehouse, brick C.
NOTE.—See Table 110.

TABLE 110.—DENVER (1930)—WAREHOUSES
Classification No. 20

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	9	11	13	25	30	40	4	3.3	2.5	1	None	None	None	Brick or conc.
" B	13	15	17	50	55	65	2	1.8	1.5	1 or more	Full	Conc.	"	"
" C	20	23	26	65	70	80	1.5	1.4	1.25	1 or more	"	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, no inside fin.	None	Flat	Softwood or conc.	Stove	T.	None	Non-fire resisting
" B	Brick walls, office fin.	"	"	Softwood	Steam	T. W.	1 elevator	"
" C	" "	"	"	Conc.	"	"	"	Fire resisting

FIG. 54.—Denver warehouse, brick B.
NOTE.—See Table 110.

FIG. 55.—Denver warehouse, brick C.
NOTE.—See Table 110.

TABLE 111.—CLEVELAND (1930)—WAREHOUSES[1]

Description	Cost cu. ft., cents	
	1 story	2 stories or more
Common brick, walls, wood floors, undivided floor space, no basement, stove heat, no elevators, cheap construction, 3,000 to 6,000 sq. ft. ground floor area	6½	7½
Reinforced concrete, face brick front, automatic sprinkler system, undivided floor area on all floors except first floor office, full basement, concrete floors, steam heat, toilets each floor, 7 stories, 1,233,854 cu. ft.	...	19
Reinforced concrete roof and walls, face brick front and side walls, trimmed with terra cotta, small basement for heating plant, steam heat first floor only, 6 stories, 4 plumbing fixtures, 496,450 cu. ft.	...	19½

[1] From Zangerle's "Principles of Real Estate Appraising."

In Rochester a six-story and full basement reinforced concrete warehouse having concrete floors and roof, steam heat and four elevators with a total floor area of 136,939 sq. ft. cost (1926) $3 per sq. ft.

Frame warehouses in Milwaukee cost (1926) 7¢ per cu. ft., brick and mill-type warehouses from 12 to 16¢ per cu. ft. and fire-resisting steel and reinforced concrete warehouses 16¢ per cu. ft. These figures do not include heating, lighting, automatic sprinklers, plumbing or offices.

Table 112, gives the cost of warehouses in St. Paul.

TABLE 112.—ST. PAUL (1930)—WAREHOUSES

Description	Cost cu. ft., cents						
	Common brick	Conc. block	Face brick	Mill type	Protected const.	Reinf. conc.	Steel frame
2 to 4 story warehouses, rough, unplastered walls	10 to 15	10 to 15	11 to 16	13 to 18	14 to 18	14 to 19	
5 to 8 story warehouse, rough unplastered walls	11 to 16	.....	12 to 17	14 to 19	15 to 19	15 to 20	16 to 22

Cincinnati warehouse costs are shown in Table 113.

TABLE 113.—CINCINNATI (1930)—WAREHOUSES

Class	Description	Cost cu. ft., cents
A-1	Fire resisting, modern, good construction	25
A-2	" " " average construction	20
B-1	Mill-type construction	18
C	Ordinary type, cheap construction	15

San Francisco Class A warehouses cost (1925) 25¢ per cu. ft. and Class B warehouses 22¢ per cu. ft. steel frame warehouses from four to seven stories in height in Boston cost (1927) 30¢ per cu. ft.

The Associated General Contractors of Los Angeles state that Class A steel-frame warehouses cost from 20 to 30¢ per cu. ft., Class A reinforced concrete warehouses 15 to 25¢ per cu. ft. and Class C brick warehouses 15¢ per cu. ft.

The cost of steel-frame, mill-type construction warehouses in Birmingham (1928) was 15½¢ per cu. ft. and for fire-resisting good construction reinforced concrete warehouses 17½¢ per cu. ft.

Class A good construction fire-resisting warehouses in Chicago cost (1927) from 30.to 40¢ per cu. ft., Class B mill-type construction warehouses from 20 to 30¢ per cu. ft. and Class C ordinary type cheap construction warehouses from 15 to 25¢ per cu. ft.

John Buys in an article in the *National Real Estate Journal* gave the cost (1927) of a concrete block warehouse with face-brick front, size 50 by 100 ft., having an automatic sprinkler system and a small office with steam heat at $1.40 to $1.60 per sq. ft. Steel-frame construction warehouses from four to seven stories in height cost (1927) 30¢ per cu. ft. Table 114 gives the cost of warehouses in Detroit.

TABLE 114.—DETROIT (1930)—WAREHOUSES

Description	Cost cu. ft., cents
Fireproof, under 300,000 cu. ft.	17 to 23
Mill-type construction	14 to 20
Ordinary type, cheap construction, brick	13 to 18
Frame	9 to 13

Table 115 gives the cost of Portland, Ore., warehouses.

TABLE 115.—PORTLAND ORE. (1926)—WAREHOUSES

Description	Cost sq. ft.
Good construction, brick or reinforced concrete, automatic sprinkler system, elevators, fire-resisting construction	$1.70 to $2.10
Ordinary type, brick or cement block elevator, fire-resisting, average construction	1.00 to 1.70
Frame construction, roof and walls of corrugated iron, elevator, no basement	0.65 to 0.90
Frame construction, common siding, no elevator, dirt floor	0.40 to 0.50

For 1930 deduct 6 to 10%.

CHAPTER XVI

GARAGES AND SERVICE STATIONS

Public Garage and Service Station Construction.—The tremendous increase in automobile production and ownership and its resultant traffic regulation problems have had considerable influence on the type of public garage and service station construction.

High land values will often prohibit the extension of public garages over large ground floor areas as a result of which multistory garages are now being constructed. The multistory public garage has been made possible by the installation of automatic elevators, ramps and other efficient automobile handling equipment. One new type in particular requires the services of attendants on the gound floor only, all other handling being entirely mechanical. Several large hotels and office buildings have garages for guests or tenants either in the basement or on the roof. Mechanical equipment for the washing, cleaning and painting of automobiles also has been developed.

Public Garage Buildings.—The Cleveland system (1930) gives the cost of a one-story, cheap construction, brick and hollow-tile wall, cement-floor garage building at $1.95 per sq. ft. (15¢ per cu. ft.). This garage has an unfinished interior and a small boiler room basement, tar and gravel roof, steam heat, 3 plumbing fixtures, area 7,000 to 10,000 sq. ft. A good constructed garage similar to the above but having a finished office and front display room with large plate-glass windows costs $2.40 per sq. ft. (17¢ per cu. ft.).

The 1930 Rochester cost of a one-story steel-frame, concrete floor, fire-resisting public garage building was $4.62 per sq. ft. or 24¢ per cu. ft. This type of garage has a plate-glass front with ornamental terra-cotta trim, saw-tooth roof, mill construction, steam heat, three toilet rooms, tile sales floors.

The Portland Ore., system shows a cost of $1.16 to $1.35 per sq. ft. (8 to 9½¢ per cu. ft.) for an average construction, concrete wall, public garage building with a flat tar and gravel roof,

no basement, concrete floor, steam heat, tile trim, ten plumbing fixtures. A two-story reinforced concrete public garage building cost (1926) $1.75 to $1.85 per sq. ft. This building has a small boiler room in basement, plate-glass front, flat, tar and gravel roof, wooden trusses, steam heat and four plumbing fixtures.

The 1930 Milwaukee cost of public garage buildings is given in Table 116.

TABLE 116.—MILWAUKEE (1930)—PUBLIC GARAGE BUILDINGS

Description	Cost cu. ft., cents
1 story, brick, flat, tar and gravel roof	12
1 story, reinf. conc. fire, resisting flat roof	14
2 to 6 stories, reinf. conc., fire resisting, flat roof	17

The 1930 St. Paul cost of public garage buildings is given in Table 117.

TABLE 117.—ST. PAUL (1930)—PUBLIC GARAGE BUILDINGS

Description	Cost cu. ft., cents
1 story, no basement except boiler room, conc. blocks	10 to 14
" " " " " " " stucco on tile	11 to 16
" " " " " " " face brick	12 to 18
" " " " " " " reinf. conc	13 to 18
" " " " " " " steel frame	14 to 19
2 stories and basement, reinf. conc	14 to 22
Over 2 stories and basement, reinf. conc	16 to 23

The Cincinnati cost of public garages is as follows:

TABLE 118.—CINCINNATI (1930)—PUBLIC GARAGE BUILDINGS

Description	Cost cu. ft., cents
Fire resisting, modern salesroom and service	25
" " " average construction	20
Semi-fire resisting	15

Grace and Bernieli, general contractors, San Francisco, give the cost (1925) of public garage buildings as follows:

TABLE 119.—SAN FRANCISCO (1925)—PUBLIC GARAGE BUILDINGS

Description	Cost cu. ft., cents
1 story, good construction	18
2 " " "	23
3 or more stories, good construction	26

L. F. Dow Co. gives the cost (1929) of New York City one-story public garage with shop and display room, modern interior and exterior, hydraulic auto lift, fireproof concrete and steel at 32¢ per cu. ft.; for two story, with ramps, no elevator, concrete and steel at 27¢ per cu. ft.

The rates used by the Duluth assessor (1930) for public garage buildings are given in Table 120.

TABLE 120.—DULUTH (1930)—PUBLIC GARAGE BUILDINGS

Description	Cost cu. ft., cents
Frame construction, 9-ft. ceiling, hot water heat, concrete floors, pine ceiling	20
Brick construction, 12-ft. ceiling, stove heat, concrete floors	15
Brick construction, tile trim, 10-ft. ceiling, hot water heat, concrete floor	25

The 1927 cost of brick veneer and reinforced concrete public garage buildings in Minneapolis varied from 12 to 18¢ per cu. ft. Reinforced concrete public garage buildings in Birmingham (1928) cost 17¢ per cu. ft. and brick with wood roof and floor construction public garage buildings cost 15¢ per cu. ft.

Fire-resisting public garages in Chicago cost (1927) from 30 to 40¢ per cu. ft. and non-fire-resisting public garage buildings

cost from 20 to 30¢ per cu. ft. John E. Parsons states that the average cost of large public garages in the United States in 1925 was 28¢ per cu. ft.

The rates used by the Detroit assessor (1930) for public garage buildings are given in Table 121.

TABLE 121.—DETROIT (1930)—PUBLIC GARAGE BUILDINGS

Description	Cost cu. ft., cents
Fire resisting	18 to 25
Mill-type construction	14 to 20
Ordinary type construction	13
Frame	9

Rates used for public garage buildings by the Los Angeles assessor are given in Table 122.

TABLE 122.—LOS ANGELES (1930)—PUBLIC GARAGE BUILDINGS

Description	Cost sq. ft.
Frame construction, cheap	$0.20
" " average	0.40
" " good	0.75
Brick construction, Class C, cheap	1.00
" " " " average	1.25
" " " " good	1.50

Table 123 gives the 1930 cost of Denver public garage buildings.

Allen E. Beals, vice president of the L. F. Dow Service gives the cost (1929) of New York square-type frame hangars at 14¢ per cu. ft.; T-type frame hangars, no heat, at 26¢ per cu. ft.; and T-type metal hangars at 23¢ per cu. ft.

TABLE 123.—DENVER (1930)—PUBLIC GARAGE BUILDINGS
Classification No. 22

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Brick A	7	9	11	20	25	30	5	4	3.3	1	None	None	None	Brick or conc.
" B	11	13	15	30	40	50	3.3	2.5	2	1	Full	Conc.	"	"
" C	14	16	18	40	50	55	2.5	2	1.8	1	"	"	"	"
" D	14	16	18	50	55	65	2	1.8	1.5	2	Small	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Brick A	Brick walls, no inside fin.	None	Flat	Soft-wood	Stove	T.	None	Non-fire resisting
" B	Brick walls, office fin.	"	"	Conc.	Steam	T. W.	"	"
" C	" "	"	"	"	"	"	"	Fire resisting
" D	" "	"	"	"	"	"	1 elevator	"

FIG. 56.—Denver public garage, brick C.
NOTE.—See Table 123.

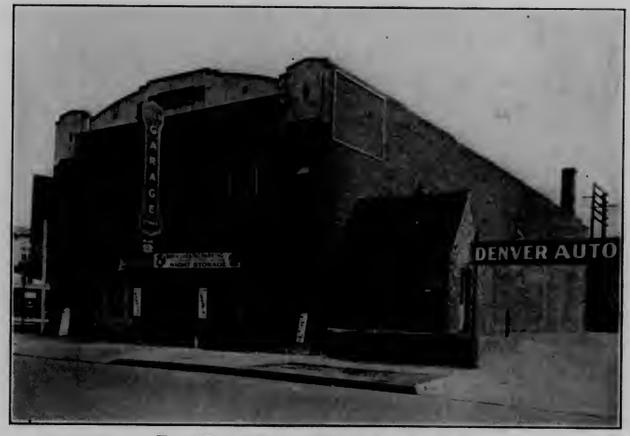

FIG. 57.—Denver public garage, brick D.
NOTE.—See Table 123.

Service Station Construction.—There is a great variety of service stations—from the humble frame shack to the beautiful tiled roof and terra-cotta stations of the big oil companies.

FIG. 58.—Denver service station, type A.
NOTE.—See Table 124.

FIG. 59.—Denver service station, type B.
NOTE.—See Table 124.

Public comfort stations, oiling pits and racks, telephone booths and air, gas, and water dispensers are characteristic service station improvements.

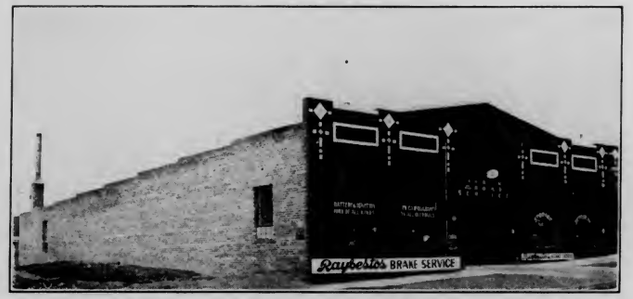

FIG. 56.—Denver public garage, brick C.
NOTE.—See Table 123.

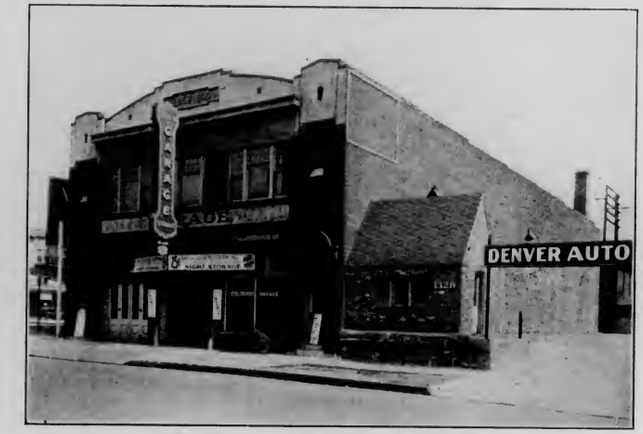

FIG. 57.—Denver public garage, brick D.
NOTE.—See Table 123.

Service Station Construction.—There is a great variety of service stations—from the humble frame shack to the beautiful tiled roof and terra-cotta stations of the big oil companies.

FIG. 58.—Denver service station, type A.
NOTE.—See Table 124.

FIG. 59.—Denver service station, type B.
NOTE.—See Table 124.

Public comfort stations, oiling pits and racks, telephone booths and air, gas, and water dispensers are characteristic service station improvements.

TABLE 124.—DENVER (1930)—SERVICE STATIONS
Classification No. 24

Class	Cost	Life, years			Ann. phys. dep., %			Size	Const.	Drives	Air pumps	Lights	Remarks
		Poor	Aver.	Good	Poor	Aver.	Good						
A	$800 to $1,200	25	30	35	4	3.3	2.9	Small	Brick or stucco	Gravel	None	Ordinary	
B	1,000 to 2,500	25	30	35	4	3.3	2.9	Medium	Brick	Conc.	1	"	
C	3,000 to 4,000	30	35	40	3.3	2.9	2.5	Large	"	"	2	Ornamental	
D	4,000 and up	40	50	55	2.5	2	1.8	"	Tile or T. C.	"	"	"	Texas Co. Continental

Service stations may be grouped for classification according to the standard types constructed by certain local oil companies. The stations will generally be uniform in construction and cost per cubic foot.

Table 124 gives the classification and cost of Denver service stations (1930).

FIG. 60.—Denver service station, type D.
NOTE.—See Table 124.

Private Garage Construction.—When private garages are used for housing purposes, they should be classified as single residences and the cost figured from a single residence classification. Small, poorly constructed garages may be classified as sheds. An additional cost should be added for sewer connections, special patented automatic doors, interior finish, heating installations, etc.

Table 125 gives the cost (1930) of private garages in Denver. Table 127 gives the cost (1930) of stock size galvanized iron portable garages which includes concrete foundation, one window, one small door and two large garage doors. These garages are bolted together on the job. The floor is gravel surfaced.

TABLE 124.—DENVER (1930)—SERVICE STATIONS
Classification No. 24

Class	Cost	Life, years			Ann. phys. dep., %			Size	Const.	Drives	Air pumps	Lights	Remarks
		Poor	Aver.	Good	Poor	Aver.	Good						
A	$800 to $1,200	25	30	35	4	3.3	2.9	Small	Brick or stucco	Gravel	None	Ordinary	
B	1,000 to 2,500	25	30	35	4	3.3	2.9	Medium	Brick	Conc.	1	"	
C	3,000 to 4,000	30	35	40	3.3	2.9	2.5	Large	"	"	2	Ornamental	Texas Co.
D	4,000 and up	40	50	55	2.5	2	1.8	"	Tile or T. C.	"	"	"	Continental

Service stations may be grouped for classification according to the standard types constructed by certain local oil companies. The stations will generally be uniform in construction and cost per cubic foot.

Table 124 gives the classification and cost of Denver service stations (1930).

FIG. 60.—Denver service station, type D.
NOTE.—See Table 124.

Private Garage Construction.—When private garages are used for housing purposes, they should be classified as single residences and the cost figured from a single residence classification. Small, poorly constructed garages may be classified as sheds. An additional cost should be added for sewer connections, special patented automatic doors, interior finish, heating installations, etc.

Table 125 gives the cost (1930) of private garages in Denver. Table 127 gives the cost (1930) of stock size galvanized iron portable garages which includes concrete foundation, one window, one small door and two large garage doors. These garages are bolted together on the job. The floor is gravel surfaced.

TABLE 125.—DENVER (1930)—PRIVATE GARAGES
Classification No. 23

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Base-ment	Base-ment floor	Base-ment finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Frame A	10	11	12	25	30	40	4	3.3	2.5	1	None	None	None	Brick or conc.
Brick A	12	13	14	25	30	40	4	3.3	2.5	"	"	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Frame A	Fr. siding no inside fin.	None	Gable, wood or comp. shingle. Flat, tar and gravel	Conc.	None	None	None	Non-fire resisting
Brick A	Brick walls no inside fin.	"		"	"	"	"	"

FIG. 61.—Denver private garage, frame A.
NOTE.—See Table 125.

FIG. 62.—Denver private garage, brick A.
NOTE.—See Table 125.

TABLE 126.—PORTABLE GALVANIZED IRON GARAGES

Type	Size	Total cost erected
Single	10′ × 15′	$133.00
"	10′ × 17½′	142.50
"	10′ × 20′	152.00
Double	15′ × 17½′	237.50
"	17½′ × 17½′	285.00
"	17½′ × 20′	308.00
"	20′ × 20′	325.00

TABLE 125.—DENVER (1930)—PRIVATE GARAGES
Classification No. 23

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Basement	Basement floor	Basement finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Frame A	10	11	12	25	30	40	4	3.3	2.5	1	None	None	None	Brick or conc.
Brick A	12	13	14	25	30	40	4	3.3	2.5	"	"	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Frame A	Fr. siding no inside fin.	None	Gable, wood or comp. shingle. Flat, tar and gravel	Conc.	None	None	None	Non-fire resisting
Brick A	Brick walls no inside fin.	"		"	"	"	"	"

FIG. 61.—Denver private garage, frame A.
NOTE.—See Table 125.

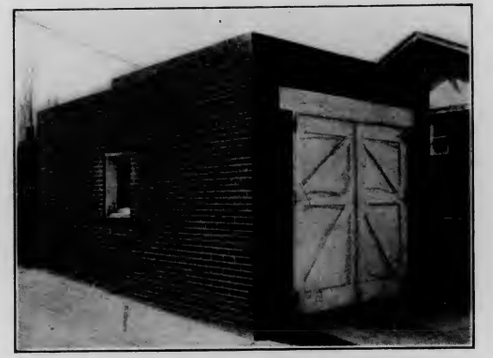

FIG. 62.—Denver private garage, brick A.
NOTE.—See Table 125.

TABLE 126.—PORTABLE GALVANIZED IRON GARAGES

Type	Size	Total cost erected
Single	10′ × 15′	$133.00
"	10′ × 17½′	142.50
"	10′ × 20′	152.00
Double	15′ × 17½′	237.50
"	17½′ × 17½′	285.00
"	17½′ × 20′	308.00
"	20′ × 20′	325.00

The Rochester assessor uses the following costs for private garages:

TABLE 127.—ROCHESTER (1930)—PRIVATE GARAGES

No. cars	Kind of const.	Description	Total cost
1	Frame siding or shingle	Aver. const., dirt floor, solid doors	$ 100
2	" " " "	" " " " " "	160
1	" " " "	Conc. floor, sash doors	200
2	" " " "	Conc. floor, sash doors, undiv.	325
3	" " " "	" " " " "	425
2	" " " "	Same, attached to res.	325
3	" " " "	" " " "	450
1	" " " "	Aver. const., conc. floors, sash doors, elec. lights	325
2	" " " "	" " " " " "	550
3	" " " "	" " " " " "	700
1	Frame stucco	" " " " " "	400
2	" "	" " " " " "	675
3	" "	" " " " " "	850
1	Conc. block	" " " " " "	450
2	" "	" " " " " "	750
3	" "	" " " " " "	950
1	Brick	" " " " " "	600
2	"	" " " " " "	900
3	"	" " " " " "	1,175
2	Frame siding or shingle	Attached to res., aver. const., conc. floor, elec. light	550
3	" " " "	" " " " " "	700
2	Frame stucco	" " " " " "	675
3	" "	" " " " " "	850
2	Conc. block	" " " " " "	750
3	" "	" " " " " "	950
2	Brick	" " " " " "	900
1	Frame siding or shingle	Good const., conc. floor, sash doors, elec. lights, sewer, water	450
2	" " " "	" " " " " "	750
3	" " " "	" " " " " "	1,000
1	Frame stucco	" " " " " "	550
2	" "	" " " " " "	925
3	" "	" " " " " "	1,200
1	Tile and stucco	" " " " " "	650
2	" " "	" " " " " "	1,100
3	" " "	" " " " " "	1,400
1	Tile and brick	" " " " " "	725
2	" " "	" " " " " "	1,225
3	" " "	" " " " " "	1,575
1	Brick	" " " " " "	775
2	"	" " " " " "	1,300
3	"	" " " " " "	1,700
2	Tile and stucco	High-class, expensive const., sewer, water, lights	1,400
3	" " "	" " " " " "	1,800
2	Tile and brick	" " " " " "	1,550
3	" " "	" " " " " "	2,000
2	Brick	" " " " " "	1,650
3	"	" " " " " "	2,150

The cost per square foot for Rochester garages with living quarters on the second floor is given in Table 128.

TABLE 128.—ROCHESTER (1930)—GARAGES WITH LIVING QUARTERS ON SECOND FLOOR

Kind of const.	Description	Cost sq. ft.
Shingle or siding	Good const., elec. lights, sewer, water, conc. 1st floor, softwood, plaster finish 2nd floor	$4.50
Frame or stucco	" " " " "	5.00
Tile and stucco	" " " " "	5.40
Tile and brick	" " " " "	5.80
Brick	" " " " "	6.00
Tile and stucco	High class, expensive const., conc. 1st floor, hardwood, 2d floor, plaster finish 2d floor, sewer, water, lights	7.00
Tile and brick	" " " " "	7.60
Brick	" " " " "	7.90

The Portland, Ore., system gives the 1926 cost of a frame siding, single-car garage, gable, wood-shingle roof, concrete floor, double-sash door, size 12 by 18 ft. as 90¢ to $1 per sq. ft. for average construction. A good constructed double garage with frame siding walls, gable shingle roof, concrete floor, size 18 by 18 ft. cost 80 to 90¢ per sq. ft.

Milwaukee private garage costs (1930) are given in Table 129.

TABLE 129.—MILWAUKEE (1930)—PRIVATE GARAGES

Description	Cost sq. ft.
Galvanized iron	$1
Frame or stucco	2
Brick	3

The cost (1930) of Los Angeles private garages is given in Table 130

TABLE 130.—LOS ANGELES (1930)—PRIVATE GARAGES

Description	Cost sq. ft.
Frame, cheap	$0.20
" average	0.40
" good	0.75
Brick, cheap	1.00
" average	1.25
" good	1.50

Cincinnati private garage costs (1930) are shown in Table 131.

TABLE 131.—CINCINNATI (1930)—PRIVATE GARAGES

Description	1 car	2 car	3 car	4 car
Metal, knockdown	$ 50	$ 80	$100	$ 120
Frame	220	380	450	580
Stucco	260	450	550	700
Brick	420	750	900	1,100

NOTE.—For each additional car space add ⅔ the difference in value between 1- and 2- car garages.

Boston brick garages cost (1927) from $3 to $4 per sq. ft. Minneapolis frame garages cost (1927) from 10 to 15¢ per cu. ft. and brick garages 15 to 35¢ per cu. ft.

John Buys in the *National Real Estate Journal* gives the 1927 cost of an 18 by 18 ft. double-frame garage 10 ft. high at 11 to 12¢ per cu. ft. and for a brick double garage 21 to 22¢ per cu. ft.

The Detroit assessor uses the following rates for private garages (1930):

TABLE 132.—DETROIT (1930)—PRIVATE GARAGES

Material	1 car	2 car	3 car	4 car
Frame	$100	$200	$300	$400
Stucco on frame	200	300	400	500
Brick veneer	200	300	400	500
Brick	300	400	500	600

CHAPTER XVII

GREENHOUSES, BARNS, SHEDS AND MISCELLANEOUS BUILDINGS

Greenhouse Construction.—Greenhouse construction for both steel-frame and wood-frame buildings is well standardized. Table 133 gives the 1930 cost of greenhouses in Denver. When Khules putty and Libby-Owens glass are used, add 1¢ to the cubic foot costs given in the table. Several types of automatic

FIG. 63.—Denver greenhouse.
NOTE.—See Table 133.

sprinklers and non-breakable glass have been introduced within the past few years.

The Los Angeles system (1930) gives the cost of wood-frame glassed greenhouses at 30¢ per sq. ft. and steel-frame glassed greenhouses at 50¢ per sq. ft. These figures do not include the heating plant.

TABLE 130.—LOS ANGELES (1930)—PRIVATE GARAGES

Description	Cost sq. ft.
Frame, cheap	$0.20
" average	0.40
" good	0.75
Brick, cheap	1.00
" average	1.25
" good	1.50

Cincinnati private garage costs (1930) are shown in Table 131.

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John Buys in the *National Real Estate Journal* gives the 1927 cost of an 18 by 18 ft. double-frame garage 10 ft. high at 11 to 12¢ per cu. ft. and for a brick double garage 21 to 22¢ per cu. ft.

The Detroit assessor uses the following rates for private garages (1930):

TABLE 132.—DETROIT (1930)—PRIVATE GARAGES

Material	1 car	2 car	3 car	4 car
Frame	$100	$200	$300	$400
Stucco on frame	200	300	400	500
Brick veneer	200	300	400	500
Brick	300	400	500	600

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The Los Angeles system (1930) gives the cost of wood-frame glassed greenhouses at 30¢ per sq. ft. and steel-frame glassed greenhouses at 50¢ per sq. ft. These figures do not include the heating plant.

TABLE 133.—DENVER (1930)—GREENHOUSES
Classification No. 25

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep. %			Footings	Side walls	Frames	Glass	Putty	Remarks
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good						
A.....	4	5	6	10	15	20	10	6.6	5	Brick or conc.	Brick, conc. or wood	2nd. hand pipe or redwood	Med. stock, Baker Bros.	Common	
B.....	7	8	9	20	25	30	5	4	3.3	"	Brick or conc.	Angle iron, I beams & flat steel	Baker Bros. or other med. price, stock	"	

NOTE.—1. Khules putty and Libby-Owens glass add 1¢ to any class or rate.
2. Benches are included in all rates, deduct 1¢ if not used.
3. Heating plant to be added as a unit.
4. Deduct 1¢ if average height is over 12 ft., add 1¢ if under 10 ft.
5. If new pipe is used, add 1¢ to rate.

Barns and Sheds.—As a general rule barns and sheds are built at the same time as the residence and are of similar construction, in which case the same life and depreciation factors used for the residence may be applied.

Table 134 gives the 1930 Denver cost of poultry houses and Table 135 gives the 1930 Denver cost of barns and sheds.

TABLE 134.—DENVER (1930)—FRAME POULTRY HOUSE

Description	Cost cu. ft., cents
Frame siding, shingle roof, dirt floor, cheap const.....	7
" " " " " " aver. "	8
" " " " " " good "	9

TABLE 135.—DENVER (1930)—BARNS AND SHEDS
Classification No. 27

Class	Cost cu. ft., cents			Life, years			Ann. phys. dep., %			Stories	Base-ment	Base-ment floor	Base-ment finish	Found. walls
	Poor	Aver.	Good	Poor	Aver.	Good	Poor	Aver.	Good					
Frame A	9	10	11	..	..	..	..	..	..	1 or more	None	None	None	Brick or conc.
Brick A	12	13	14	..	..	..	..	..	..	"	"	"	"	"

Class	Finish	Porches	Roof	Floor	Heat	Plumbing	Built-in features	Remarks
Frame A	Frame walls, no inside fin.	None	Lean-to or gable	Dirt	None	None	None	Non-fire resisting
Brick A	Brick walls, no inside fin.	"	Gable, shingle	Softwood or conc.	"	"	"	"

NOTE.—Give same life and depreciation as main building.

In the Los Angeles system (1930) the cost of frame out buildings varies from 20¢ per sq. ft. for cheap construction to 75¢ per sq. ft. for good construction. In Cincinnati frame and metal sheds cost (1930) 5¢ per cu. ft. and brick sheds 8¢ per cu. ft. Standard city ice houses cost $350.

Grace and Bernieli give the cost of San Francisco corrugated iron buildings (1925) at 9¢ per cu. ft. In the Minneapolis system the cost (1927) of frame buildings varies from 6 to 10¢ per cu. ft.

Table 136 gives the cost of Detroit poultry houses, barns and sheds.

TABLE 136.—DETROIT (1930)—POULTRY HOUSES, BARNS AND SHEDS

Description	Cost cu. ft., cents
Frame sheds, enclosed, without heat, dirt floor	6
" " " " " wood or conc. floor	8½
Brick sheds, enclosed, without heat, dirt floor	12½
" " " " " wood or conc. floor	13½
All steel sheds enclosed, without heat, dirt floor	4½
" " " " " " wood or conc. floor	6
Open shelter, frame sheds	3½

The Los Angeles system (1930) gives the following costs on small miscellaneous buildings:

Brick Bake Ovens.—40¢ per cu. ft.

Swimming Pools.—Concrete construction, 20 to 30¢ per cu. ft.

Brick Kilns.—$100 per lin. ft. of diameter for round kilns; 25¢ per cu. ft. for square or rectangular kilns.

Brick chimneys or stacks 10 ft. in diameter at the bottom cost $30 per vertical foot for height of 60 ft., $40 per vertical foot for height over 60 ft. A chimney 15 ft. in diameter at the bottom costs $40 per vertical foot for height of 60 ft.; $45 per vertical foot for height over 60 ft. (The authors believe that these figures are about 20 per cent low.)

Steel Stacks.—Guyed, 6 ft. in diameter at $12 per vertical foot.

Vaults.—Reinforced concrete, 40¢ per cu. ft.; brick, 20¢ per cu. ft.; ordinary single door, including time clock, $800.

Tent Houses.—Not assessed if only temporary.

Jap Shacks.—Measured and assessed the same as other sheds.

Combination Buildings.—Any building having a combination of two or more types of construction should be assessed using the cost factors applicable to each type.

Lath Houses.—Cheaply built lath houses supported by small posts used for protection from the sun, 5¢ per sq. ft. Substantially built lath houses 10¢ per sq. ft. and up. Allow 10 per cent per annum physical depreciation up to 80 per cent total.

Table 137 gives the Los Angeles cost of silos.

TABLE 137.—LOS ANGELES (1930)—SILOS

Description	Size	Total cost
Redwood	10′ diam. × 20′ height	$210
"	10′ " × 24′ "	250
"	10′ " × 30′ "	310
"	12′ " × 32′ "	385
"	14′ " × 28′ "	400
"	14′ " × 36′ "	510
"	16′ " × 36′ "	570
"	16′ " × 40′ "	630
"	20′ " × 40′ "	790
Concrete	10′ " × 30′ "	400
"	12′ " × 30′ "	440
"	12′ " × 40′ "	480
"	14′ " × 30′ "	480
"	14′ " × 40′ "	500
"	14′ " × 50′ "	600
"	14′ " × 60′ "	750
"	20′ " × 50′ "	1,080
"	20′ " × 60′ "	1,200

NOTE.—Allowable depreciation 6 per cent per annum, maximum depreciation 60 per cent.

CHAPTER XVIII

BUILDING COST DETAILS

Detail Cost Requirements.—In making an appraisal of a property it very seldom happens that a building will fulfill exactly the standard specifications of any given classification. Additions or deductions must be made for certain features which vary from the standard classification. It is necessary that the appraiser be able to determine the value of these exceptional features.

In this chapter the authors endeavor to give the cost of various items of construction with which the appraiser generally comes into contact. The appraiser should, however, secure local present-day costs for all items to be considered.

The cost data given in this chapter have been secured from a number of reliable sources. The cost of building materials was furnished largely by the Division of Building and Housing of the Bureau of Standards, Department of Commerce, Washington, D. C., in the report of material cost for 50 cities dated Jan. 1, 1929. The figures used are the average cost figures for the 50 cities. Labor cost is furnished by the *Engineering News-Record*, Jan. 3, 1929, and the *American Contractor*, Feb. 16, 1929, and is the average cost of labor in 60 cities.

TABLE 138.—BUILDING MATERIAL COSTS
Average 50 Cities, Jan. 1, 1929, F. O. B. Job

Item	Unit	Cost per unit
Brick, common	Thousand	$ 17.00
" face	"	34.00
Ceiling	1,000 ft. b. m.	47.50
Celotex	" sq. ft.	50.00
Cement	Barrel	2.75
Cinder block 4" × 8" × 12"	Thousand	100.00
" " 6" × 8" × 16"	"	155.00
" " 8" × 8" × 16"	"	210.00
Cold water paint	Pound	0.10
Concrete block 5" × 4" × 12"	Thousand	44.00
" " 5" × 8" × 12"	"	68.00
Corrugated iron, painted	100 sq. ft. 26" wide, 28 ga.	4.35
" " galv	" " " " " "	6.00
Doors, interior, white pine	Square feet	0.40
" exterior, " "	" "	0.55
Flooring, yellow pine, flat grain, 1" × 4", 10'–16'	1,000 ft. b. m.	71.10
Flooring, Douglas fir, vert. grain, 1" × 4", 10'–16'	" " " "	73.45
Flooring, oak, plain red, $1\frac{3}{16}$" × 2¼"	" " " "	90.00
Floor stain	Gallon	3.20
Glass, single strength	100 sq. ft.	8.40
Gravel	Cubic yard	2.10
Kalsomine	Pound	0.10
Lath, cedar	Thousand	10.00
" metal, 24 ga., 3.4 lb. sq. yd	Square yard	0.30
Lime, hydrated	Ton	20.00
Linseed oil	Gallon	1.15
Lumber, yellow pine No. 1, 2" × 4", 16'	1,000 ft. b. m.	43.50
Lumber, Douglas fir No. 1, 2" × 4", 16'	" " " "	43.00
Lumber, N. C. pine, No. 1 2" × 4", 16'	" " " "	41.00
Lumber, 1" × 6" common boards No. 1	" " " "	40.00
Nails, wire, 20, penny	100 lb. keg	3.80
Paper, tar, 2 ply 75 lb	Roll, 100 sq. ft.	2.60
" red rosin, 3 ply 30"	Roll, 500 sq. ft.	1.30
Paint, lead and oil	Gallon	3.50
Pipe, 1" galv	100 ft.	10.75
" cast iron, soil 4"–13 lb	Ton	62.20
Plaster, gypsum	Ton	16.45
Plaster board ¾"	1,000 sq. ft.	26.35
Rock, crushed ¾"	Cubic yard	2.70
Sand	"	2.10
Shellac	Gallon	3.50
Shingle stain	"	2.25
Shingles, red cedar, clear 16", 5 to 2	100 sq. ft.	5.85
Shingles, cypress, clear 16", 5 to 2	" " "	7.75
Shingles, composition, slate surfaced	" " "	7.65
" asbestos	" " "	9.75
Shiplap	1,000 ft. b. m.	50.00
Siding, drop	" " "	64.00
" bevel	" " "	57.00
Slate roofing, No. 1 ribbon	100 sq. ft.	13.40
Steel reinforcing, ¾" round	100 lb.	3.30
" structural	"	3.95
Tile, clay, 8" × 12" × 12"	Thousand	100.00
" " 6" × 12" × 12"	"	115.00
" " 4" × 12" × 12"	"	84.00
" gypsum, 3" thick	Square feet	0.09
" " 4" thick	" "	0.105
" clay roofing	100 sq. ft.	22.00
Varnish	Gallon	3.50
Wall board	1,000 sq. ft.	35.00
Windows, white pine	Square feet	0.37

TABLE 139.—BUILDING LABOR COSTS
Average 60 Cities, Jan. 1, 1929

Trade	Wage per hour
Bricklayers	$1.50
" tenders	0.70
Carpenters	1.00
Cement finishers	1.00
Electricians	1.10
Hoisting engineers	1.00
Iron workers, ornamental	1.10
" " structural	1.165
Laborers	0.50
Lathers, metal	1.25
" wood	1.20
Marble setters	1.25
Painters	1.00
Plasterers	1.40
" tenders	0.75
Plumbers	1.25
Roofers, composition	0.90
" slate and tile	1.00
Sheet-metal worker	1.05
Steam fitter	1.25
Stone mason	1.35
Tile setters	1.30

Excavation.—Table 140 gives the average cost of excavation figuring labor at 50¢ per hour. Residence and small store excavation is done by the pick and shovel method, and business and industrial building excavation is done with steam shovels. Add 30¢ per cu. yd. for team haul under ¼ mile for residences and small store excavations.

TABLE 140.—COST OF EXCAVATION

Description	Material excavated	Cost cu. yd.
Residences and small stores, max. depth 8 ft., dumped on premises	Light loam or sand	$0.50
" " " " "	Heavy loam or med. clay	0.80
" " " " "	Hardpan or cemented grav.	1.10
Business and industrial, buildings, material hauled from premises	Light loam or sand	0.75
" " " "	Heavy loam or med. clay	0.80
" " " "	Hardpan or cemented grav.	0.85

Walls.—Table 141 gives the average cost per 100 sq. ft. for common types of walls.

TABLE 141.—COST OF WALLS

Kind	Description	Cost 100 sq. ft.
Frame	1" sheathing on 2" × 4" studs, 16" crs.	$ 13.00
"	Galv. corrug. iron on 2" × 6" studs, 24" crs	15.20
"	Bevel siding on 1" sheathing on 2" × 4" studs, 16" crs.	25.30
"	Bevel siding on building paper on 1" sheathing on 2" × 6" studs, 16" crs. with lath and plaster inside	40.90
"	Drop siding on building paper on 1" sheathing on 2" × 6" studs, 16" crs. with lath and plaster inside	39.32
"	Wood shingles on building paper on 1" sheathing on 2" × 6" studs, 16" crs. with lath and plaster inside	41.88
"	Bevel siding on gypsum plaster board on 2" × 6" studs, 16" crs., lath and plaster inside	42.57
"	Bevel siding on insulite sheathing on 2" × 6" studs, 16" crs., lath and plaster inside	41.98
"	Bevel siding on building paper on 1" sheathing on 2" × 6" studs, 16" crs. with plaster and gypsum plaster board base inside	42.51
Stucco, cement	On Bishopric stucco base on 1" sheathing on 2" × 6" studs, 16" crs. with lath and plaster inside	43.81
" "	On wood lath on 2" × 6" studs, 16" crs. with lath and plaster inside	33.72
" "	On metal lath on building paper on 1" sheathing on 2" × 6" studs, 16" crs. with plaster on metal lath inside	47.54
Face brick veneer	On building paper on T. & G. sheathing on 2" × 6" studs, 16" crs. with lath and plaster inside	64.86
Brick	8" common brick, plaster inside	59.00
"	8" face brick exterior, plaster inside	77.51
"	12" common brick, plaster inside	82.41
"	12" face brick exterior, plaster inside	103.88
"	8" common brick, interior lath and plaster on furring	62.97
"	8" face brick exterior, interior lath and plaster on furring	81.48

TABLE 141.—COST OF WALLS.—(*Continued*)

Kind	Description	Cost 100 sq. ft.
"	12" common brick, interior lath and plaster on furring	91.13
"	12" face brick exterior, interior lath and plaster on furring	110.60
Hollow tile	8" face brick exterior, hollow tile backing, plaster inside	69.70
" "	12" face brick exterior, hollow tile backing plaster inside	81.20
" "	8" tile stuccoed outside, plastered inside	68.50
" "	12" tile, stuccoed outside, plastered inside	88.18
Conc. block	8" plain block, stuccoed outside, plastered inside	70.74
" "	12" plain block, stuccoed outside, plastered inside	83.81
" "	8" rock faced, plastered inside	44.83
" "	12" rock faced, plastered inside	63.75
Concrete	8" solid, plain, single forms, ½ cost of forms included	37.30
"	8" solid, plain, double forms, ½ cost of forms included	43.90
"	12" solid, plain, single forms, ½ cost of forms included	47.80
"	12" solid, plain, double forms, ½ cost of forms included	54.40
"	8" solid, stuccoed outside, plastered inside, ½ cost of forms included	63.18
"	12" solid, stuccoed outside, plastered inside, ½ cost of forms included	71.41
"	8" solid, stuccoed outside, plaster on lath on furring inside, ½ cost of forms included	69.38
"	12" solid, stuccoed outside, plaster on lath on furring inside, ½ cost of forms included	79.09

Roofs.—The cost of residences given in Chap. IX is based upon the assumption that the roofs are one-fourth pitch. Where roofs are constructed with a greater pitch, there will be an increase in cost, and, where roofs are constructed with a lesser pitch, there will be a decrease in cost.

Table 142 shows the difference in cost of roofs constructed with varying pitches for an average residence and Table 143 gives the value ratio of gable roofed residences for different pitches of roof. Figure 64 shows the various roof pitches.

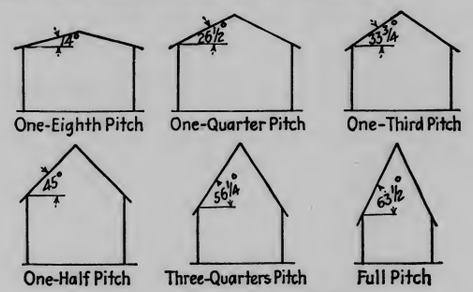


FIG. 64.—Various roof pitches.

TABLE 142.—COST OF ROOFS FOR VARYING PITCHES

Type or pitch of roof	Percentage of cost of ¼ pitch roof
1/5	96.82
¼	100.00
1/3	107.22
3/8	110.67
½	123.91
2/3	144.20
¾	155.12
Full	190.00
Hip	100.00
Mansard	124.00
Gambrel	130.00

TABLE 143.—COST OF GABLE ROOFED RESIDENCES FOR DIFFERENT PITCHES

Pitch of gable roof	Multiply total cost of residence by this factor
1/5	0.9980
¼	1.0000
1/3	1.0037
3/8	1.0055
½	1.0124
2/3	1.0230
¾	1.0287
Full	1.0468

Table 144 gives the cost per 100 sq. ft. of the more common types of roofs.

TABLE 144.—COST OF ROOFS

Type of roof	Rafters	Sheathing	How laid	Kind of roof	Cost 100 sq. ft.
Flat	2″ × 6″	1″	Tight, diag.	4 ply T & G	$16.54
"	"	"	" "	5 ply "	17.54
"	2″ × 8″	"	" "	4 ply "	17.11
"	"	"	" "	5 ply "	18.11
Pitched	2″ × 6″	"	Open space	Wood shing. stained	25.42
"	"	"	Tight and bldg. paper	"	29.45
"	"	"	"	Comp. shing.	25.20
"	"	"	"	Asbes. shing.	29.40
"	"	"	Tight and fiber bd.	Wood shing.	38.60
"	2″ × 8″	"	Tight	Clay tile	46.07

NOTE.—All rafters are spaced at 16 in. centers.

Floors.—Table 145 gives the cost of floors most generally used in building construction. The cost of flooring is given in Table 145.

TABLE 145.—COST OF FLOORS

Description	Cost 100 sq. ft.
Shiplap on 2″ × 8″ joists, 16″ crs. painted two coats	$17.82
1″ × 4″ yellow pine, flat grain, on 2″ × 8″ joists, 16″ crs., 3 coat finish	23.45
1″ × 4″ yellow pine, flat grain, on 2″ × 10″ joists, 16″ crs., 3 coat finish	25.95
1″ × 4″ yellow pine, flat grain, on 1″ sheathing laid tight on 2″ × 8″ joists, 16″ crs., 3 coat finish	29.89
1″ × 4″ yellow pine, flat grain on 1″ sheathing, laid tight on 2″ × 10″ joists, 16″ crs., 3 coat finish	32.39
13/16″ × 2¼″ plain red oak on 2″ × 8″ joists, 16″ crs., 3 coat finish	25.87
13/16″ × 2¼″ plain red oak on 2″ × 10″ joists, 16″ crs., 3 coat finish	28.37
13/16″ × 2¼″ plain red oak on 1″ sheathing laid tight on 2″ × 8″ joists, 16″ crs., 3 coat finish	32.31
13/16″ × 2¼″ plain red oak on 1″ sheathing laid tight on 2″ × 10″ joists, 16″ crs., 3 coat finish	34.81
Concrete, 4″ basement	15.00
" 6″ basement	20.00
1″ hexagon tile on concrete base	80.00
6″ tile base	200.00

Partitions.—The appraiser may have occasion to figure the cost of partitions due to alterations, new construction, etc. Table 146 gives the cost per 100 sq. ft. of common types of partitions 8 ft. high.

TABLE 146.—COST OF PARTITIONS

Description	Cost 100 sq. ft.
Sheathing, 1″ × 8″ on one side, 2″ × 4″ studs, 16″ crs.	$ 13.00
" " " " " " " 24″ crs.	11.53
Wood lath and plaster, two sides, 2″ × 4″ studs, 16″ crs.	25.26
" " " " " " " 24″ crs.	24.03
Metal lath and plaster, two sides, 2″ × 4″ studs, 16″ crs.	36.08
" " " " " " " 24″ crs.	34.85
Ceiling, T & G one side, 2″ × 4″ studs, 16″ crs	17.15
" " " " " " 24″ crs	15.54
Wallboard, two sides, 2″ × 4″ studs, 16″ crs	15.58
" " " " " 24″ crs	14.35
Sheetrock gypsum board 3/8″, two sides, 2″ × 4″ studs, 16″ crs.	19.58
" " " " " " " " 24″ crs.	18.35
Celotex, two sides, 2″ × 4″ studs, 16″ crs	19.58
" " " " " 24″ crs	18.35
Tile wainscoting	135.00

NOTE.—For 2 by 6-in. studs at 16 in. centers add $1.20 per 100 sq. ft. to cost of 2 by 4-in. studs at 16 in. centers. For 2 by 6-in. studs at 24 in. centers add 85¢ per 100 sq. ft. to cost of 2 by 4-in. studs at 24 in. centers. All costs based on partition having double top plate, one bottom plate and one row bridging.

Built-in Millwork.—In residence construction the cost of built-in millwork such as cabinets, desks, mantels, etc., can generally be estimated on the basis of the cost per square foot of exposed surface. Table 147 gives the average cost installed of different kinds of millwork and finish.

TABLE 147.—COST OF MILLWORK IN PLACE

Description	Cost sq. ft. of exposed surface	
	White pine or fir	Oak
Cabinet work, bookcases, writing desks, buffets, etc.	$ 3.40	$ 4.40
Cabinet work, kitchen cabinets, linen closets, clothes cabinets, broom closets, ironing board, etc.	2.35	3.00
Medicine cabinet, each	15.00	
Colonnades, per set	100.00	130.00

Porches.—Table 148 gives the cost per square foot for common types of porches.

TABLE 148.—COST OF PORCHES

Description	Cost sq. ft.
Cheaply constructed wood porch, shingle roof, no ceiling, cornice or balustrade, 100 sq. ft. area	$0.80
Ordinary wood porch with columns, shingle roof, enclosed cornice, balustrade, beaded ceiling, 100 sq. ft. area	1.25
Face brick porch, side and end walls, heavy columns, enclosed cornice, beaded ceiling, conc. floor, steps	2.75
Small open rear porch	1.25
" enclosed rear porch	1.75
Roofed and glassed in brick porch, 150 sq. ft.	3.00
" " " " frame " " " " "	2.35

Painting.—Table 149 gives the cost per 100 sq. ft. for painting on various surfaces.

TABLE 149.—COST OF PAINTING

Surface painted	Description of coat	Cost 100 sq. ft.
Concrete, smooth surface	Cold water paint	$0.70
" " "	Lead and oil paint	2.28
Exterior woodwork	Stain	1.53
" "	Varnish	1.90
" "	Lead and oil paint	1.50
Floors, wood	Paste filler	1.47
" "	Shellac	1.08
" "	Varnish	1.55
" "	Lead and oil paint	1.62
" "	Machine sanding	0.80
Interior woodwork	Paste filler	1.60
" "	Shellac	1.90
" "	Varnish	1.71
" "	Lead and oil paint	1.63
Roof, wood shingle	Stain	2.38
Stucco, rough	Lead and oil paint	2.83
Brick walls	Coldwater paint	0.81
" "	Lead and oil paint	2.46

Plumbing.—The cost of three grades of plumbing installations including the necessary piping for the average city residence is given in Table 150.

TABLE 150.—COST OF PLUMBING

Fixture	Cost installed		
	Cheap	Aver.	Good
Kitchen sink	$ 50	$ 70	$ 90
Laundry tubs, two compartment	50	70	90
Lavatory, wash bowl	60	85	105
Water closet	75	100	120
Bath tub	95	125	150
Shower bath	100	150	200

Heating.—The cost of steam, hot water and vapor heating systems is generally determined upon the basis of the number of square feet of radiation required. One of the most common rules for figuring the number of square feet of radiation for a low pressure steam system is the "200-20-2" rule which is—

$$R = \frac{V}{200} + \frac{W}{20} + \frac{O}{2}.$$

In which

R = square feet of radiation required.
V = volume of room in cubic feet.
W = exterior wall area minus door and window openings in square feet.
O = exterior door and window openings in square feet.

Example.—Determine the number of square feet of radiation required for a room 16 by 12 by 9 ft. height, which has one door 3 by 7 ft., two windows 2.5 by 4.5 ft. and two exterior walls.

$$R = \frac{16 \times 12 \times 9}{20} + \frac{(16 \times 9) + (12 \times 9) - (3 \times 7) - (2.5 \times 4.5)}{20} + \frac{(3 \times 7) + (2.5 \times 4.5)}{2}$$

$= 86.4 + 10.54 + 16.13$
$= 113.07$ sq. ft.

Allowance must be made for poor construction, metal weather stripping, insulation, etc. Hot-water systems will require about 45 per cent more radiation than a low-pressure steam system. Table 151 gives the average cost of heating systems for a five-room modern residence.

TABLE 151.—COST OF HEATING SYSTEMS, FIVE-ROOM MODERN RESIDENCES

Type of heating plant	Cost complete installed	
	Sq. ft. radiation	Total cost
Hot air, pipeless	.....	$175
" " 24-in. pipe	.....	200
" " 28-in. pipe	.....	250
Steam, one pipe	$2.75	450
Hot water	3.25	550
Vapor	3.50	600
Oil burner, extra	....	450
Thermostat, heat control	....	125

TABLE 152.—CLEVELAND (1930)—COST OF HEATING SYSTEMS[1]

Plant	Square feet	1 story	2 story
Hot air	600 to 800	$150	$ 200
" "	800 to 1,000	180	250
" "	1,000 to 1,200	220	320
Hot water, steam or vapor	600 to 800	490	730
" " " " "	800 to 1,000	580	900
" " " " "	1,000 to 1,200	660	1,040
" " " " "	1,200 to 1,400	710	1,170
" " " " "	1,400 to 1,600	750	1,270

[1] From Zangerle's "Principles of Real Estate Appraising."

Fireplaces.—The average cost of brick fireplaces including mantel and hearth is given in Table 153.

TABLE 153.—COST OF FIREPLACES

Description	Width over all		
	4 ft.	6 ft.	8 ft.
Blind	$ 50	$ 60	$ 70
1 story	250	450	600
2 "	350	550	700

Sprinkler Systems.—The Los Angeles (1930) system figures a cost of $5 per head covering 80 sq. ft. and $6.50 per head covering 100 sq. ft. If the heads cannot be counted, figure 6 to 8¢ per sq. ft. of floor space covered. These costs include pipes, roof tank and complete system installed.

Attics.—Table 154 gives the cost of finished attic rooms as used in the Rochester system (1930).

TABLE 154.—COST OF FINISHED ATTIC ROOMS

Room area, sq. ft.	Average const.	Good const.
100	$207	$248
100 to 150	273	327
150 to 250	357	428
250 to 350	463	555
350 to 500	585	740
Bathroom	150	200

NOTE.—For dormer windows 4 to 6 ft. wide and bay windows add $60 each.

Lighting.—In the Denver system $5 per outlet is allowed for electric wiring. The Cincinnati system gives the average cost of electric light fixtures as shown in Table 155.

TABLE 155.—COST OF LIGHTING FIXTURES

Average Residence Description	Cost
Obsolete	$ 25
Modern, average grade	100
Elaborate	250

Refrigeration and Insulation Systems.—The average cost of a complete single box refrigeration system for single residences is $250, and for apartments it is $125 per apartment with a single generating machine.

For cold-storage rooms add the cost per square foot of wall area insulated as shown in Table 156.

TABLE 156.—COST OF WALL INSULATION
Cold-storage Rooms

Description	Cost sq. ft. installed, cents
Balsam wool, 1″ thick	21
Insulex, 3″ thick	24
Celotex, 1″ thick	25
Sheet cork, 1″ thick	25
Ground cork, 1″ thick	21

NOTE.—3 in. of Insulex gives the same degree of insulation as 1 in. of the other materials. No extra charge for sawdust insulation.

TABLE 157.—COST OF ATTIC INSULATION
Average Residence

Description	Cost sq. ft. installed, cents
Sheet celotex, 7/16″ thick	7
Insulex, porous solidified gypsum	9
Sil-O-Cel, organic sea shell, 2″ thick	9½
Thermo-fill, porous solidified gypsum, 3″ thick	8
Balsam wool, balsam lumber, 4″ thick	6¼
Flaxinum, molded flax board, 1″ thick	11

Fireplaces.

TABLE 158.—COST OF FIREPLACES

Description	Stories	Width				
		5 ft.	6 ft.	7 ft.	8 ft.	9 ft.
Blind	1	$ 50	$ 75	$100		
"	2	100	150	200		
Inside chimney	1	150	200	300	$350	$500
" "	2	180	250	375	425	600
Outside chimney	1	175	250	400	450	650
" "	2	275	325	500	575	850

Fences.—The following data on fences is taken from the Los Angeles system (1930).

TABLE 159.—COST OF FENCES

Description	Length, feet	Cost lin. ft.
Heavy woven wire, steel posts set in concrete, top rail of tubing, with or without strand barbed wire above rail 4 ft. high	100 to 500	$0.60
" " " " " "	500 to 1,000	0.55
" " " " " "	Over 1,000	0.50
Same as above, 5 ft. high	100 to 500	0.70
" " " " "	500 to 1,000	0.60
" " " " "	Over 1,000	0.55
Same as above, 6 ft. high	100 to 500	0.80
" " " " "	500 to 1,000	0.70
" " " " "	Over 1,000	0.65
Same as above, 8 ft. high	100 to 500	0.90
" " " " "	500 to 1,000	0.80
" " " " "	Over 1,000	0.75
Light woven wire, steel posts in conc., top rail or tubing with or without strand of barb wire above rail, 4 ft. high	Any length	0.30
Same as above, 5 ft. high	" "	0.35
Same as above, 6 ft. high	" "	0.40
Light woven wire, wood posts, 4 ft. high	" "	0.25
Same as above, 5 ft. high	" "	0.30
Same as above, 6 ft. high	" "	0.35
Tennis court fence, iron posts, 10 ft. high	Standard	1.20
Same as above, 12 ft. high	"	1.40

Metal Weather Stripping.—The average cost of metal weather stripping for openings in the average residence is $3 per opening.

Ground Improvements.—The money spent on ground improvement is as much an asset to the property as the money spent for buildings and may be considered as a part of the lot value itself, or it may be added to the basic value of the lot. Ground values are increased by grading and planting and this increment of value is often expressed in the increase of value of the lot itself. Another method is to take the basic value of the unimproved lot and add thereto the value of the improvements such as grading, planting, etc.

Table 160 gives the average cost of a number of ground improvements.

TABLE 160.—COST OF GROUND IMPROVEMENTS

Description	Unit	Cost
Concrete sidewalk, 4″ thick	Sq. ft.	$0.15
Lawn	"	0.02
Trees, deciduous, shade trees, 3″ diam	Each	8.00
" common fruit, 3″ diam	"	8.00
" common evergreen, up to 10 ft. hgt	Lin. ft.	2.50
Shrubs, young	Each	0.50
" matured	"	2.00

CHAPTER XIX

APPRAISAL RECORD SYSTEMS

Necessity of Good Record System.—The success of any system for the valuation of the land and buildings of a community depends largely upon the manner of keeping a permanent record of the property itself. This record should be concisely arranged, easily accessible, readily understandable and designed to take care of future additions and revisions.

Individual record cards should be made for each parcel of improved property.

Real Estate Record Card.—The essential features of the real estate record card may be grouped as follows:

A. Information Concerning the Owner.

1. Name.
2. Address.
3. Occupancy, by tenant or owner.
4. Owner's estimate of value.

B. Information Concerning the Land.

1. Legal description.
2. Plat showing size and location.
3. Area.
4. Classification.
   (*a*) Use.
   (*b*) Topography.
   (*c*) Soil.
   (*d*) Kind and quality of crops.
5. Zoning.

C. Information Concerning the Improvements.

1. Classification of building.
2. Type of construction.
3. Character of construction.
4. State of repairs.
5. Year built.
6. Estimated life in years
7. Building permit.
8. Original cost.
9. Additions and betterments.
10. Valuation 1913 basis.

11. Occupied or vacant.
12. Picture with date.
13. Plan, distance and course from side street.
14. Side of street.
15. Use of building.
16. Stories and height in feet.
17. Fire-resisting construction.
18. Local improvements.
19. Number of rooms.
20. Exterior.
21. Front, if different.
22. Outside trim.
23. Chimneys.
24. Dormer and bay windows.
25. Porches.
26. Foundation.
27. Basement and cellar.
28. Interior finish.
29. Floors.
30. Mantels.
31. Cabinets.
32. Elevator.
33. Sprinkler system.
34. Plumbing.
35. Heating, fuel and ventilation.
36. Lighting.
37. Roof type.
38. Roof construction.
39. Garage.
40. Sheds and barns.
41. Number of cubic feet.
42. Cost per cubic foot.
43. Extras or deductions.
44. Percentage of physical depreciation.
45. Percentage of obsolescence.
46. Percentage of utility allowance.
47. Miscellaneous.
48. Remarks.

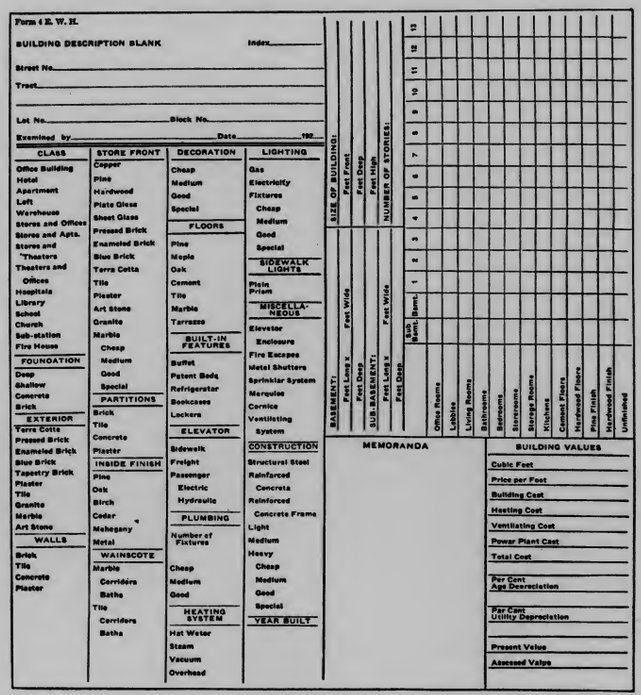
D. Information Concerning Transactions Involving Property.

1. Transfers.
2. Loans.
3. Rentals, expenses and net income.
4. Insurance.
5. Private appraisals.
6. Taxes.
7. Leases.
8. Advertised for sale.
9. Advertised for rent or lease.

E. Information Concerning Assessors' Valuation of Property.

1. Date of appraisal and investigations.
2. Assessments made recorded by years.
3. Index to file plat and field books.

Assessors' Information.—The amount of information listed above to be secured by the assessor is entirely optional. Cities


Form 4 E. W. H.

BUILDING DESCRIPTION BLANK Index

Street No.

Tract

Lot No. Block No.

Examined by Date 192

CLASS: Office Building; Hotel; Apartment; Loft; Warehouse; Stores and Offices; Stores and Apts.; Stores and Theaters; Theaters and Offices; Hospitals; Library; School; Church; Sub-station; Fire House

FOUNDATION: Deep; Shallow; Concrete; Brick

EXTERIOR: Terra Cotta; Pressed Brick; Enameled Brick; Blue Brick; Tapestry Brick; Plaster; Tile; Granite; Marble; Art Stone

WALLS: Brick; Tile; Concrete; Plaster

STORE FRONT: Copper; Pine; Hardwood; Plate Glass; Sheet Glass; Pressed Brick; Enameled Brick; Blue Brick; Terra Cotta; Tile; Plaster; Art Stone; Granite; Marble; Cheap; Medium; Good; Special

PARTITIONS: Brick; Tile; Concrete; Plaster

INSIDE FINISH: Pine; Oak; Birch; Cedar; Mahogany; Metal

WAINSCOTE: Marble; Corridors; Baths; Tile; Corridors; Baths

DECORATION: Cheap; Medium; Good; Special

FLOORS: Pine; Maple; Oak; Cement; Tile; Marble; Terrazzo

BUILT-IN FEATURES: Buffet; Patent Beds; Refrigerator; Bookcases; Lockers

ELEVATOR: Sidewalk; Freight; Passenger; Electric; Hydraulic

PLUMBING: Number of Fixtures; Cheap; Medium; Good

HEATING SYSTEM: Hot Water; Steam; Vacuum; Overhead

LIGHTING: Gas; Electricity; Fixtures; Cheap; Medium; Good; Special

SIDEWALK LIGHTS: Plain; Prism

MISCELLANEOUS: Elevator Enclosure; Fire Escapes; Metal Shutters; Sprinkler System; Marquee; Cornice; Ventilating System

CONSTRUCTION: Structural Steel; Reinforced Concrete; Reinforced Concrete Frame; Light; Medium; Heavy; Cheap; Medium; Good; Special

YEAR BUILT

SIZE OF BUILDING: Feet Front; Feet Deep; Feet High

NUMBER OF STORIES: Feet Wide

BASEMENT: Feet Long x Feet Wide; Feet Deep

SUB-BASEMENT: Feet Long x Feet Wide; Feet Deep

Sub Basmt. Basmt. 1 2 3 4 5 6 7 8 9 10 11 12 13

Office Rooms; Lobbies; Living Rooms; Bathrooms; Bedrooms; Storerooms; Storage Rooms; Kitchens; Cement Floors; Hardwood Floors; Pine Finish; Hardwood Finish; Unfinished

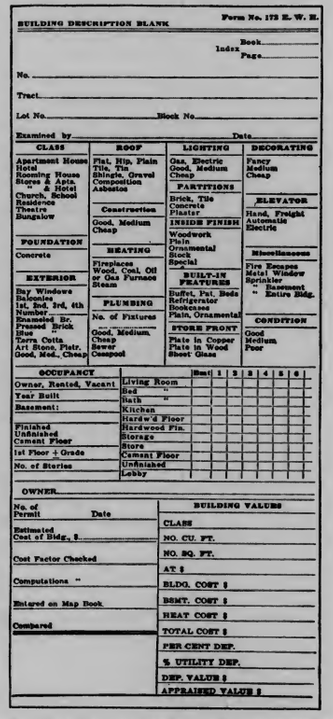
MEMORANDA

BUILDING VALUES: Cubic Feet; Price per Foot; Building Cost; Heating Cost; Ventilating Cost; Power Plant Cost; Total Cost; Per Cent Age Depreciation; Per Cent Utility Depreciation; Present Value; Assessed Value

FIG. 65.—Los Angeles class A building record card.

will have various requirements according to their size and the funds available to carry on the work. There is herewith reproduced a number of record cards used by the different cities which will give the reader a comprehensive idea as to the general typographical setup of approved types of record cards.

The cards shown in Figs. 65 to 68 inclusive are used in Los Angeles. Figure 65 applies to Class A buildings; 66 and 67 to Class B and Class C buildings; 68 to Class D buildings. The cards shown in Figs. 65 and 68 are white, the card shown in Fig. 66 23 yellow and the card shown in Fig. 67 24 pink. The classification by colors is an important help in determining the correct amount of depreciation for the building.


BUILDING DESCRIPTION BLANK — Form No. 173 E. W. E.

Book / Index / Page

No. / Tract / Lot No. / Block No. / Examined by / Date

CLASS: Apartment House; Hotel; Rooming House; Stores & Apts.; Stores & Hotel; Church, School; Residence; Theatre; Bungalow

FOUNDATION: Concrete

EXTERIOR: Bay Windows; Balconies; 1st, 2nd, 3rd, 4th Number; Enameled Br.; Pressed Brick Blue "; Terra Cotta; Art Stone, Plstr.; Good, Med., Cheap

ROOF: Flat, Hip, Plain Tile, Tile Shingle, Gravel Composition Asbestos

Construction: Good, Medium Cheap

HEATING: Fireplaces; Wood, Coal, Oil or Gas Furnace; Steam

PLUMBING: No. of Fixtures; Good, Medium, Cheap; Sewer; Cesspool

LIGHTING: Gas, Electric; Good, Medium, Cheap

PARTITIONS: Brick, Tile; Concrete; Plaster

INSIDE FINISH: Woodwork; Plain; Ornamental; Stock; Special

BUILT-IN FEATURES: Buffet, Pul. Beds; Refrigerator; Bookcase; Plain, Ornamental

STORE FRONT: Plate in Copper; Plate in Wood; Sheet Glass

DECORATING: Fancy; Medium; Cheap

ELEVATOR: Hand, Freight; Automatic; Electric

Miscellaneous: Fire Escapes; Metal Window Sprinkler; " Basement; " Entire Bldg.

CONDITION: Good; Medium; Poor

OCCUPANCY: Owner, Rented, Vacant; Year Built; Basement:; Finished; Unfinished; Cement Floor; 1st Floor + Grade; No. of Stories

	Bsmt	1	2	3	4	5	6
Living Room							
Bed "							
Bath "							
Kitchen							
Hard'd Floor							
Hardwood Fin.							
Storage							
Store							
Cement Floor							
Unfinished							
Lobby							

OWNER

No. of Permit / Date

Estimated Cost of Bldg., $

Cost Factor Checked

Computations "

Entered on Map Book

Compared

BUILDING VALUES

CLASS

NO. CU. FT.

NO. SQ. FT.

AT $

BLDG. COST $

BSMT. COST $

HEAT COST $

TOTAL COST $

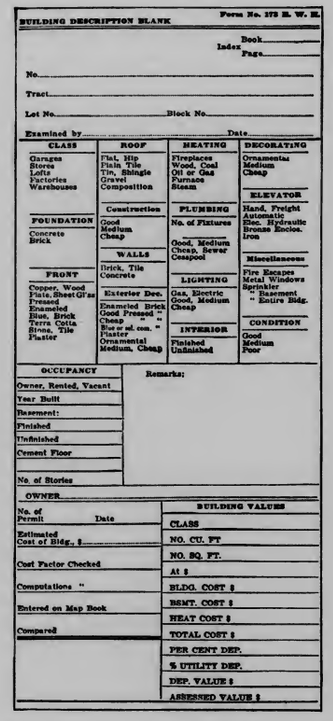
PER CENT DEP.

% UTILITY DEP.

DEP. VALUE $

APPRAISED VALUE $

FIG. 66.—Los Angeles class B building record card.


BUILDING DESCRIPTION BLANK — Form No. 173 E. W. E.

Book / Index / Page

No. / Tract / Lot No. / Block No. / Examined by / Date

CLASS: Garages; Stores; Lofts; Factories; Warehouses

ROOF: Flat, Hip; Plain Tile; Tin, Shingle; Gravel; Composition

Construction: Good; Medium; Cheap

WALLS: Brick, Tile; Concrete

Exterior Dec.: Enameled Brick; Good Pressed "; Cheap " "; Rue or sd. con. "; Plaster; Ornamental; Medium, Cheap

HEATING: Fireplaces; Wood, Coal; Oil or Gas; Furnace; Steam

PLUMBING: No. of Fixtures; Good, Medium; Cheap, Sewer; Cesspool

LIGHTING: Gas, Electric; Good, Medium; Cheap

INTERIOR: Finished; Unfinished

DECORATING: Ornamental; Medium; Cheap

ELEVATOR: Hand, Freight; Automatic; Elec. Hydraulic; Bronze Enclos.; Iron

Miscellaneous: Fire Escapes; Metal Windows; Sprinkler; " Basement; " Entire Bldg.

CONDITION: Good; Medium; Poor

FOUNDATION: Concrete; Brick

FRONT: Copper, Wood; Plate, Sheet Gl'ss; Pressed; Enameled; Blue, Brick; Terra Cotta; Stone, Tile; Plaster

OCCUPANCY: Owner, Rented, Vacant; Year Built; Basement:; Finished; Unfinished; Cement Floor; No. of Stories

Remarks:

OWNER

No. of Permit / Date

Estimated Cost of Bldg., $

Cost Factor Checked

Computations "

Entered on Map Book

Compared

BUILDING VALUES

CLASS

NO. CU. FT

NO. SQ. FT.

AT $

BLDG. COST $

BSMT. COST $

HEAT COST $

TOTAL COST $

PER CENT DEP.

% UTILITY DEP.

DEP. VALUE $

ASSESSED VALUE $

FIG. 67.—Los Angeles class C building record card.

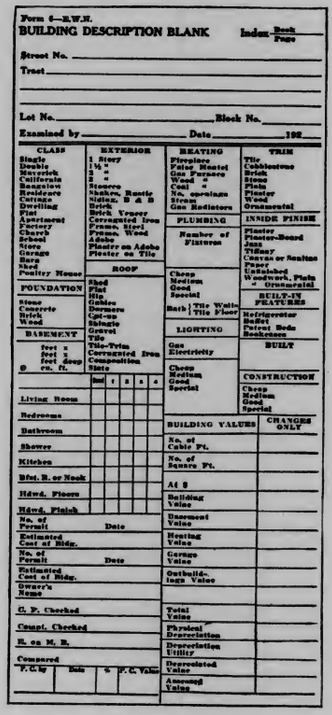

Form 6—B.W.H.
BUILDING DESCRIPTION BLANK Index—Book Page
Street No.
Tract
Lot No. Block No.
Examined by Date 192
CLASS
Single
Double
Maverick
California
Bungalow
Residence
Cottage
Dwelling
Flat
Apartment
Factory
Church
School
Store
Garage
Barn
Shed
Poultry House
FOUNDATION
Stone
Concrete
Brick
Wood
BASEMENT
feet x
feet x
feet deep
cu. ft.
EXTERIOR
1 Story
1½ "
2 "
3 "
Stucco
Shakes, Rustic
Siding, B & B
Brick
Brick Veneer
Corrugated Iron
Frame, Steel
Frame, Wood
Adobe
Plaster on Adobe
Plaster on Tile
ROOF
Shed
Flat
Hip
Gable
Dormers
Cut-up
Shingle
Gravel
Tile
Tile-Trim
Corrugated Iron
Composition
Slate
Bed | 1 | 2 | 3 | 4
Living Room
Bedrooms
Bathroom
Shower
Kitchen
Bfst. R. or Nook
Hdwd. Floors
Hdwd. Finish
No. of Permit Date
Estimated Cost of Bldg.
No. of Permit Date
Estimated Cost of Bldg.
Owner's Name
C. P. Checked
Coupl. Checked
R. on M. B.
Compared P. C. by Date % P. C. Value
HEATING
Fireplace
Pater Heated
Gas Furnace
Wood "
Coal "
No. openings
Steam
Gas Radiators
PLUMBING
Number of Fixtures
Cheap
Medium
Good
Special
Bath | Tile Wall | Tile Floor
LIGHTING
Gas
Electricity
Cheap
Medium
Good
Special
BUILDING VALUES
No. of Cubic Ft.
No. of Square Ft.
At $
Building Value
Basement Value
Heating Value
Garage Value
Outbuildings Value
Total Value
Physical Depreciation
Depreciation Utility
Depreciated Value
Assessed Value
CHANGES ONLY
TRIM
Tile
Cobblestone
Brick
Stone
Plain
Plaster
Wood
Ornamental
INSIDE FINISH
Plaster
Plaster-Board
Jute
Tilney
Canvas or Sanitas
Paper
Unfinished Woodwork, Plain
" Ornamental
BUILT-IN FEATURES
Refrigerator
Buffet
Patent Beds
Bookcases
BUILT
CONSTRUCTION
Cheap
Medium
Good
Special

Fig. 68.—Los Angeles class D building record card.

Figure 69 shows the record card used in St. Paul and Ramsey County, Minn. Figure 70 shows the record card used in Yonkers, N. Y. On this card space is left for the original computations of the assessor.

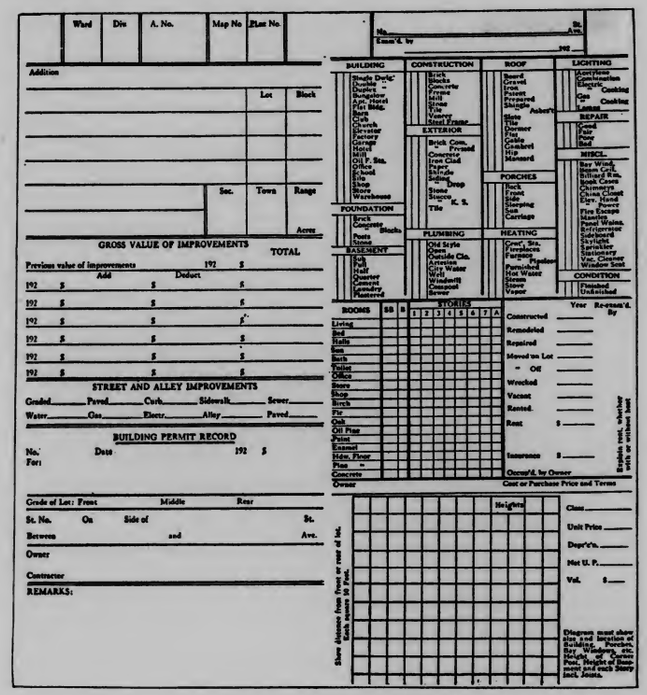

Ward Div A. No. Map No Plat No.
No. St. Exam'd. by 192
Addition
Lot Block
Sec. Town Range
Acres
GROSS VALUE OF IMPROVEMENTS TOTAL
Previous value of improvements 192 $
Add Deduct
192 $ $ $
STREET AND ALLEY IMPROVEMENTS
Graded Paved Curb Sidewalk Sewer
Water Gas Electr. Alley Paved
BUILDING PERMIT RECORD
No. Date 192 $
For:
Grade of Lot: Front Middle Rear
St. No. On Side of St.
Between and Ave.
Owner
Contractor
REMARKS:
BUILDING
Single Detd'
Double "
Duplex "
Bungalow
Apt. Hotel
Flat Bldg.
Store
Church
Garage
Factory
School
Hotel
Office
Oil P. Sta.
Office
School
Flats
Shop
Ware
Warehouse
FOUNDATION
Brick
Concrete
Blocks
Posts
Stone
BASEMENT
Full
Half
Quarter
Cement
Plastered
CONSTRUCTION
Brick
Blocks
Concrete
Frame
Stone
Tile
Veneer
Steel Frame
EXTERIOR
Brick Com. Veneered
Concrete
Iron Clad
Paper
Shingle
Siding
Drop
Stone
Stucco
Tile
PLUMBING
Old Style
Open
Outside Cis.
Arteries
City Water
Well
Windmill
Faucets
Sewer
HEATING
Coal, Sta.
Fireplaces
Furnace
Pipeless
Furnished
Hot Water
Steam
Stove
Vapor
ROOF
Board
Gravel
Iron
Paper
Shingled
Slate
Tile
Dormer
Cut-up
Gable
Combrel
Hip
Mansard
PORCHES
Deck
Front
Side
Sleeping
Sun
Carriage
LIGHTING
Electric
Gas
Combine
REPAIR
Good
Fair
Poor
Bad
MISCL.
Bay Wind.
Bldg. Paper
Billiard Rm.
Book Cases
Chimneys
China Closet
Dgr. Bored
Power
Fire Escape
Mantels
Panel Walls
Refrigerator
Sideboard
Skylight
Sprinkler
Speaking Tube
Vac. Cleaner
Window Seat
CONDITION
Finished
Unfinished
ROOMS SB B STORIES 1 2 3 4 5 6 7 A
Living
Bed
Bath
Sun
Bath
Toilet
Office
Store
Shop
Birch
Fir
Oak
Oil Pine
Paint
Enamel
Hdw. Floor
Pine "
Concrete
Owner
Year Re-mem'd. By
Constructed
Remodeled
Repaired
Moved on Lot
" Off
Wrecked
Vacant
Rented.
Rent $
Insurance $
Occup'd. by Owner
Cost or Purchase Price and Terms
Explain rent, whether with or without heat
Heights
Class
Unit Price
Depr'c'n.
Net U. P.
Val. $
Diagram must show size and location of Building, Porches, Bay Windows, etc. Height of Curbs, Posts, Height of Basement and each Story incl. Attic.
Show distance from front or rear of lot, with name of St.

Fig. 69.—St. Paul building record card.

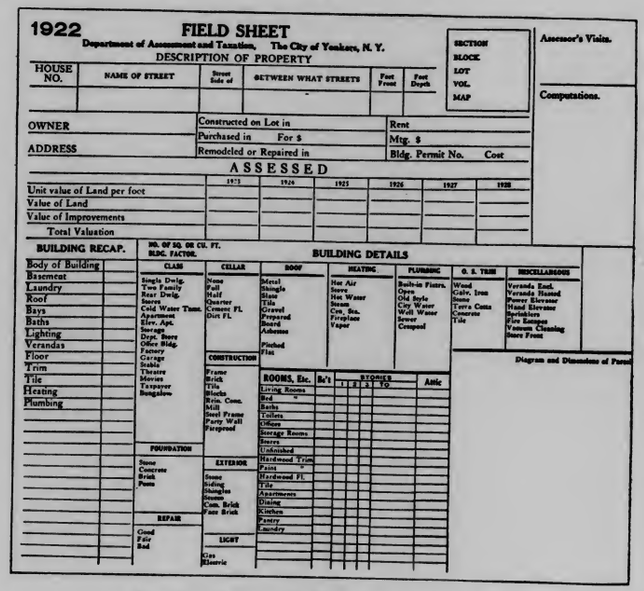

1922 FIELD SHEET
Department of Assessment and Taxation, The City of Yonkers, N. Y.
DESCRIPTION OF PROPERTY
HOUSE NO. | NAME OF STREET | Street Side of | BETWEEN WHAT STREETS | Feet Front | Feet Depth
SECTION BLOCK LOT VOL. MAP
Assessor's Visits.
Computations.
OWNER
ADDRESS
Constructed on Lot in
Purchased in For $
Remodeled or Repaired in
Rent
Mtg. $
Bldg. Permit No. Cost
ASSESSED
1925 1926 1927 1928
Unit value of Land per foot
Value of Land
Value of Improvements
Total Valuation
BUILDING RECAP.
Body of Building
Basement
Laundry
Roof
Bays
Baths
Lighting
Verandas
Floor
Trim
Tile
Heating
Plumbing
NO. OF SQ. OR CU. FT. BLDG. FACTOR.
BUILDING DETAILS
CLASS
CELLAR
ROOF
HEATING
PLUMBING
O. S. TRIM
MISCELLANEOUS
CONSTRUCTION
FOUNDATION
EXTERIOR
REPAIR
LIGHT
ROOMS, Etc.
Diagram and Dimensions of Parcel

FIG. 70.—Yonkers, N. Y., building record card.

Figure 71 with photographs attached, gives complete data for a steel-frame construction apartment house and store building in Buffalo, N. Y.

FIG. 71.—Buffalo, N. Y., building record card.

Figure 72 shows the record card used in Denver. A small photograph of the building is attached to the card. Land values are constantly in process of revision to keep pace with current

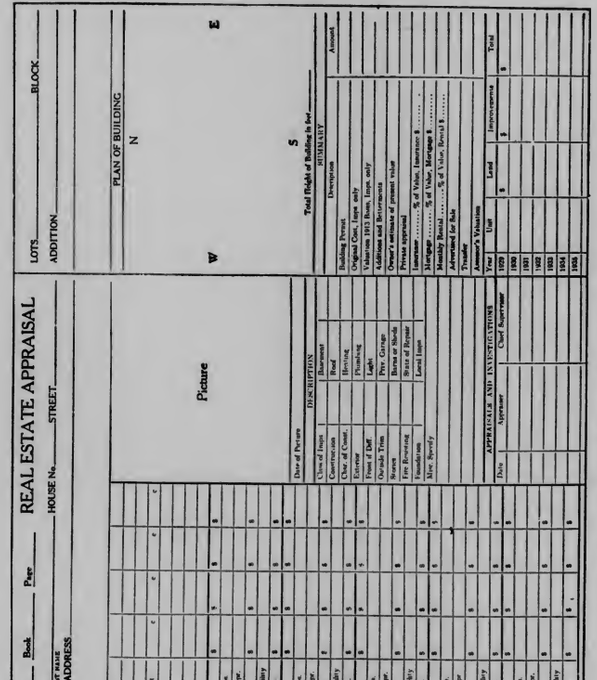


Fig. 72.—Denver building record card. (Front.)

developments and a complete review of all land values is made at intervals of four to five years. The building valuations are checked and depreciated annually.

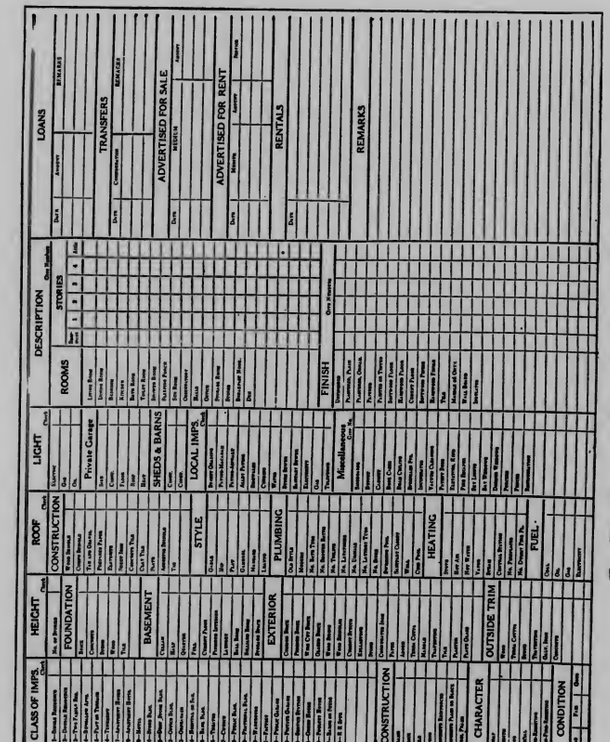


Fig. 72.—Denver building record card. (Back.)

Plat Book Page

Taxing District

Owner Address

Tr. Lot Addn. Blk. Lot Dese. Acres

Feet Front	Feet Deep	Unit Value	% of Unit Value	% Triangle	% Alley	% for Cor	Actual Unit	Tax Value

ITEMS	VALUATION										
	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935
Land											
Bldg. No. 1											
" " 2											
" " 3											
" " 4											
Totals											

REMARKS

TRANSFER

Permit No. { House / Garage — Date / Date — Age / Age

Kind of Bldg.		Est Cost	
Ext. Walls		Roof	
Foundation		Basement	
Int. Finish		Attic	
Plumbing		Heating	

Condition of Building: Poor — Fair — Good

Schedule Class Base Factor Add or Deduct For Area

STORIES	DIMENSIONS	AREA	Actual Factor	TOTALS
	X			
	X			
	X			

ADDITIONS OR DEDUCTIONS FOR	ADD	DEDUCT
Basement		
Siding		
Tile Roofing		
Dormers		
Bays		
Outside Chimney		
Porches		
Plaster		
Tile Floors		
Cabinets		
Mantels		
Plumbing		
Heating		
Depreciation		
Obsolescence		
TOTAL Additions and Deductions		
Net Additions and Deductions		

Appraised for Taxes

Garage: Size x Material Tax Value

Total

Notice No. Appraised by

FIG. 73.—Akron, Ohio, residence record card.

Figures 73, 74 and 75 shows record card used for dwellings, commercial and factory buildings and farm properties respectively, in Akron, Ohio.

Plat Book Page

Taxing District

Owner Address

Tr. Lot Addn. Blk. Lot Dese. Acres

Feet Front	Feet Deep	Unit Value	% of Unit Value	% Triangle	% Alley	% for Cor	Actual Unit	Tax Value

ITEMS	VALUATION										
	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935
Land											
Bldg. No. 1											
" " 2											
" " 3											
" " 4											
Totals											

REMARKS

TRANSFER

STREET No. NAME OF BLDG

OCCUPANCY—Basement 1st Flr. 2nd & 3rd

SIZE	Floors	Total Bldg. Height	No. Cu. Feet	No. Sq. Feet	Date Built	Orig. Cost	Sched	Class	Reprod Factor	Total Reprod Cost	% Dep'n	% Obsol	TAX VALUE
X													
X													
X													
X													

Class: APARTMENT HOUSE, STORE BLDG, OFFICE BLDG, HOTEL, SHOP, BANK, STORES & OFFICES, WAREHOUSE, PUB. ASSEM. BLDG

Foundation: STONE, CONC, BRICK, TILE, PILING

Basement: FULL-HALF-SUB

Plumbing: OPEN, CONCEALED

Construction: FRAME, BRICK, TILE, RE-CONC, MILL, STEEL FRAME, STONE

O.S. Trim & Ext.: WOOD, GALV IRON, STONE, TERRA-COTTA, CONC, BRICK, COM-PRESS-CUT

Roof: METAL, TAR & GRAVEL, FELT BUILT UP, COMPO

Heating: STEAM, WATER, FURNACE, STOVES

Repair: GOOD, FAIR, BAD

Misc.: POWER ELEV, HAND ELEV, SPRINKLER SYS, FIRE ESCAPE, VENT SYSTEM, RESERVE PR. PLT, GLASS COM Plate, Lead, Wire, STORE FRONT OLD, NEW

ROOMS	B	1	2	3	4	5	6	Balance	Total
TOILET									
OFFICE									
STORES									
STORAGE									
UNFINISHED									
HARDWOOD									
PINE									
FLOORS—PINE									
MAP'L									
TILE									
INT. DECORATING									
Int. Decorating									

SKETCH

NOTE. Elev. Heating Equipt. Sprinkler System, and Vaults are Inc in this Bldg Appraisal.

FIG. 74.—Akron, Ohio, commercial and factory building record card.

Plat Book No. Page No.
Taxing District HUDSON TWP.

Owner Address

Tract Lot Description Acres

Classification	Acres A	Acres Mds.	VALUATION 1925	1926	1927	1928	1929	1930	1931	1932	1933
Cultivated (a)											
Arable (b)											
Timber (c)											
Orchard (d)											
Waste (e)											
Total Surface											
Land Value											
Bldg. Value											
Total											

Transfers

Allow $25 per inch of Public Highway or Canal on maps drawn 400 ft. to the inch.

HOUSES

Kind	Ext. Walls	Roof	Foundation	Int. Fin.	Attic	Plumbing	Heating	Dimensions	Age	Cond.	TAX VALUE
1.								x			
2.								x			
3.								x			

Remarks:

BARNS

	Kind	DIMENSIONS	COND.	
1.		x	COND.	Poor Fair Good
2.		x	COND.	Poor Fair Good
3.		x	COND.	Poor Fair Good

SILOS

	Kind	DIMENSIONS	COND.	
1.		x	COND.	Poor Fair Good
2.		x	COND.	Poor Fair Good

GARAGES

Kind	DIMENSIONS	COND.	
	x	COND.	Poor Fair Good

OTHER BLDGS.

Kind	DIMENSIONS	COND.	
	x	COND.	Poor Fair Good

TOTAL BLDG. VALUE

FIG. 75.—Akron, Ohio farm property record card.

Figure 76 shows the record card used by the Manufacturers Appraisal Co. of Philadelphia in the revaluation of property in Youngstown, Ohio.

MAIN BUILDING—1926

KIND OF BUILDING—Res.—Single, Double, Duplex, Apartment, Garage, Business, Factory, Warehouse
BASEMENT—Whole, Part Cement Floor
FOUNDATION—Stone, Brick, Concrete, Piers. Posts
WALLS—Brick—Common, Face, Veneer, Hollow Tile, Stucco, Stone, Concrete Block, Steel Cage. Reinforced Concrete
FRAME—Weatherboard, Metal, Board and Batten
FLOORS—Wood Joist, Mill Construction, Pine, Hardwood Floor Reinforced Concrete, Cement, Marble, Tile, Fireproof, Terrazo.
ROOF—Wood, Concrete, Steel Trusses, Flat, Hip, Gable, Mansard, Gambrel
ROOFING—Composition, Shingle, Slate, Tin, Galv. Iron, Tile.
BUILT-IN FEATURES—China Closet, Bookcase, Buffet.
TRIM—Plain, Ornamental. Exterior—Stone, Marble, Terra Cotta, Galv. Iron, Copper. Interior—Plaster, Pine, Hardwood, Metal Ceiling
ROOMS
HEATING—Stoves, Furnace, Steam, Hot Water, Vapor, Fireplaces.
PLUMBING—Sewer, Water, Fixtures Bath Room
LIGHTING—Electric, Gas, Lamps
ELEVATORS—Power, Hand, Freight, Passenger
SPRINKLER SYSTEM
SPECIAL
NOTES

The Manufacturers' Appraisal Company, Philadelphia.

SIZES OF BUILDING SECTIONS

Wide Deep Story | Wide Deep Story
Wide Deep Story | Wide Deep Story
Wide Deep Story | Wide Deep Story

No. Sq. Ft. | Price Sq. Ft. | $
% Good | Value Main Bldg. | $
— CONDITION — New | Good | Fair | Bad | $
Lack of Utility Yes No | Additional Buildings | $
Remodeled Yes No | $
Occupied Yes No | Total All Buildings | $
Age

LAND—1926 ASSESSMENT

Inlot Outlot Plate Block
Owner
Street
Plat

FRONT & DEPTH	UNIT	PER CENT	FRT. FT. PRICE	COMPUTED VALUE

Street Improved
" Unimproved
" Partly Improved
Land Dep'n %

Value Land - $
Value Buildings $
Total - - - $

Youngstown City, Mahoning County, O.

ADJUSTMENT

	Add	Year	Reduce	Apr.	Aud.	B-R	Tax Com.	Tax Value
Lot								
Bldg.								

NOTES:

FIG. 76.—Youngstown, Ohio, building record card.

Figures 77 and 78 show cards used in Omaha for city and farm lands, respectively.

DIST. ADD.
Description Lot Block
No. St. Ave.
1926 Valuation Land $ Improvement Apr.

BUILDING: Sngl. Dwlg. / Duplex / St. Louis / Terrace / Apt. House / Store / Store & Flats / Garage / Yr. Built ..... / SIZE ..... x ..... / Stories / Rooms / Apartments / .....Rm. Each / Stories / Flats.....Rm. / Garage.....

CONSTRUCTION: Frame / Brick / Brick Ven. / Concrete / Concrete Blk. / Stucco / Mill / Fireproof

FOUNDATION: Brick / Concrete / Concrete Blk. / Posts

BASEMENT: Full / Bench / None / Cem. Floor

ROOF: Flat / Hip / Gable / Dormer / Wd. Shingle / Comp. Shingle / Asbt. Shingle / Tile

PLUMBING: City Water / Sewer / Gas / Baths / Toilets / Old Style / Open / Well / Cesspool

HEATING: Stove / Furnace / Hot Water / Steam

LIGHTING: Gas / Electric / None

PORCHES: Back / Front / Side / Sleeping / Bay Window / Extentions / Cem. Walk / Cem. Drive

MISCL.: Fireplace / Bookcases / Beam Ceilings / Buffet / Breakfast-nook / Fin. Attic / St. Graded / St. Ungraded / St. Paved / Sold / ..... / $ ..... / CONDITION / Finished / Unfinished / Good / Fair / Poor

VALUATIONS			SIZE OF LOT x	SHOW LOCATION OF IMPROVEMENTS ON LOT 10 Ft. TO THE SQUARE
YEAR	LAND	IMPROVEMENT		
1925				
1926				
1927				
1928				
1929				
1930				
1931				
1932				
1933				
1934				
1935				
1936				
1937				
1938				

FIG. 77.—Omaha, Neb., city property record card.

Dist. Sec. Twp Rng.
Description
Acres Miles to Road No. Paved Gravel Graded
1926 Valuation Land $ Impr. $

AC | LAND: Level / Rolling / Rough / Waste / Timber / Creeks
SOIL: Good / Fair / Poor / Sand / Subj. Overflow / Drainage Dist.

IMPROVEMENTS | VALUE:
House.....x.....Stories
Brick, Frame, Stucco, Modern
Barn .....x.....Mow
Barn x
Cribs
Hog-house.....x
Chicken-house.....x
Granary.....x
Silo
Garage.....x
Owner

VALUATIONS		
YEAR	LAND	IMPROVEMENT
1925		
1926		
1927		
1928		
1929		
1930		
1931		
1932		
1933		
1934		
1935		
1936		
1937		
1938		

Show location of improvements on land, each square being 40 acres.
Be sure to mark direction and size used for each square.

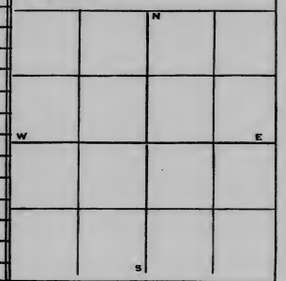


FIG. 78.—Omaha, Neb., farm property record card.

Figure 79 shows cards used in Duluth, Minn., and shows the amount of assessments placed upon the property by the assessor and the different boards of taxation.

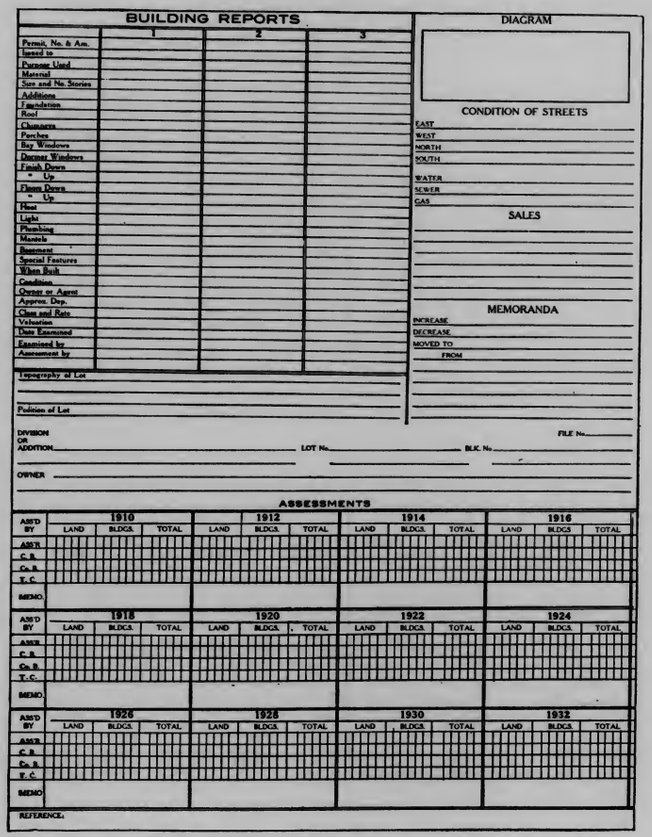


Fig. 79.—Duluth, Minn., building record card.

Figure 80 was used in the 1929 Chicago reappraisal.

A discussion of the various factors mentioned in this chapter will be given in Chap. XX.

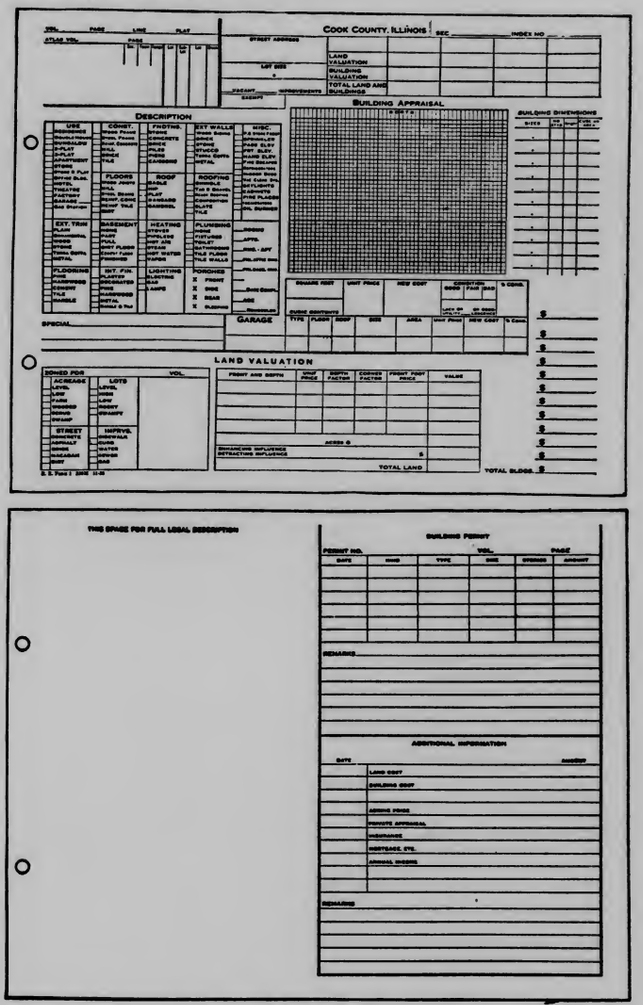


Fig. 80.—Chicago building record card.

CHAPTER XX

FIELD APPRAISAL METHODS

Field Party.—The field appraisal work generally can be handled by parties composed of two men, each of whom is a capable, qualified appraiser; however, one man properly trained is often able to do the field appraisal work.

Building Plan.—The building measurements should be noted first, and a plan of the building drawn showing its shape and size. It is not necessary that this plan be drawn to exact scale, but it should be neatly drawn to approximate scale, and written dimensions should govern all computations. A uniform method of drawing the plans should be established, one of the best rules being to consider the top of the record card as being north. If, however, the streets run at an angle to true north, the lines should be drawn parallel with the edges of the record card and an arrow designating true north shown on the plan. The street on which the building fronts should be shown and named, and the distance to the nearest cross street should be shown.

Measuring the Building.—It is very seldom difficult to measure the exterior width and length of a building, but it is often difficult to measure the height. This can be done in a number of ways as follows:

1. Actual rule measurement.
2. Counting the number of brick or siding courses.
3. Counting lengths of sheet iron.
4. Formula method.

Actual Rule Measurement.—A 6- to 10-foot pocket folding rule is convenient for measuring either the exterior or interior height of a building. It is best to measure from floor to floor and from ceiling to the top of roof for height measurement. An experienced appraiser can estimate the pitch of a roof by observation and quickly determine the height to be added above the top floor ceiling by applying the rules given in Chap. VIII.

Pitch of Roof.—The pitch of a roof is the rise divided by the span. Figure 81 shows roofs of various pitches commonly used in building construction.

Count Courses.—For commercial and industrial buildings it is very often practical to count the number of brick courses or siding courses and compute the heights. Brick walls are generally laid up measuring from 13 to 15 courses for every 3 ft. in height. Lap or drop siding walls are constructed using from 9 to 12 courses for every 3 ft. in height.

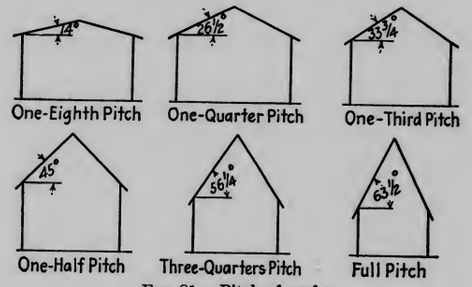


FIG. 81.—Pitch of roofs.

Corrugated Siding.—For corrugated iron siding buildings, the sheet length can be measured and the number of sheets in height counted, allowing for overlap. This will give the height of a building.

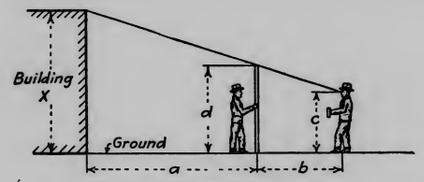


FIG. 82.—Height of building.

Formula Method.—At times it may be impossible or impracticable to measure the height of a building by any of the above methods. The formula given below may be of some help to the appraiser in securing the height of a building (see Fig. 82).

Let x = height of building.
a = distance from building to measuring rod.
b = distance from rod to observer.
d = height of rod, usually 10 to 12 ft.
c = height of observer's eye.

The formula for height is

$$x = \frac{(a + b) \times (d - c)}{b} + c. \quad (1)$$

Or, if we consider d and c constants, there is a definite relationship existing between d and c which we will call k. $k = d - c$. Formula (1) can then be reduced to Formula (2) as follows:

$$x = k\left(\frac{a + b}{b}\right) + c. \quad (2)$$

Height of Buildings.—Rules for measuring the height of a building are given in Chap. VIII.

The approximate height of buildings of various types is given in Table 161.

TABLE 161.—HEIGHT OF BUILDINGS

Type of building	Basement, feet	First floor, feet	Second floor, feet	Upper floors, feet
Old residence	9	10	9	
New residence	8	9	8	
Apartment house	9	10	10	9
Hotel	10	13	12	12
Stores	9	11	9	
Department store	12	20	15	15
Old office bldg	10	15	13	13
New office bldg	12	20	11	11
Warehouse	12	14	13	13
Public garage	..	15		
Private garage, gable with attic	..	14.5		
Private garage, gable roof	..	12		
Private garage, flat roof	..	10		

Legal Description.—In order that the assessor may be informed as to the origin and laws governing property rights in land, a brief outline of the development of the same in the various states will be given. The public domain includes all lands owned and controlled by the United States.

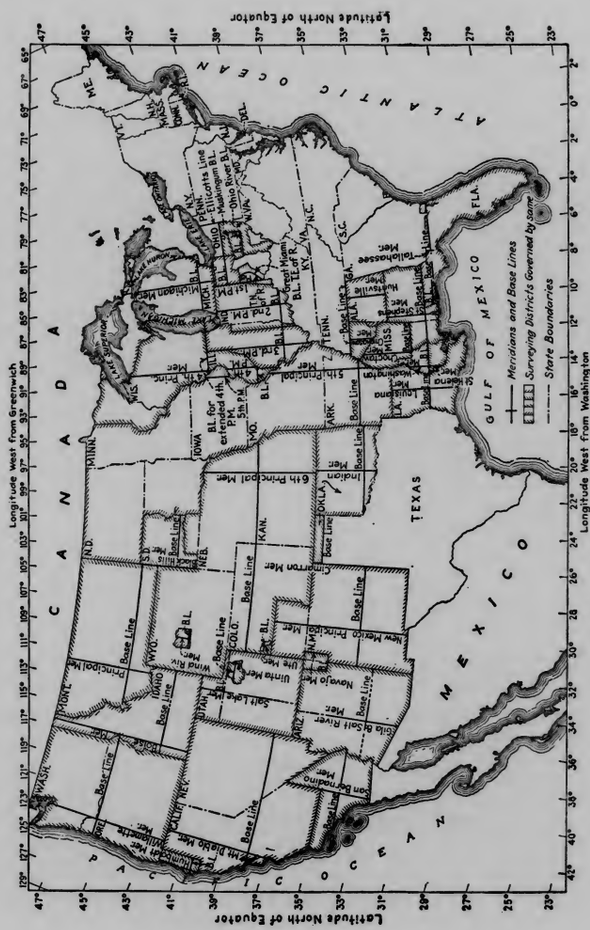


FIG. 83.—U. S. rectangular system of surveys.

Rectangular System of Surveys.—The map (Fig. 83) shows that part of the United States where the rectangular system of surveys, as adopted by Congress, May 18, 1796, has been established. In the remaining area, metes and bounds descriptions are used in describing properties. Figure 83 shows the principal meridians and base lines used in the government surveys. Ranges are numbered east and west from principal meridians and townships are numbered north and south from base lines. Where properties are described by "metes and bounds," the starting point is taken as being a certain course and distance from one or more permanent objects, such as a section corner, tree, rock,

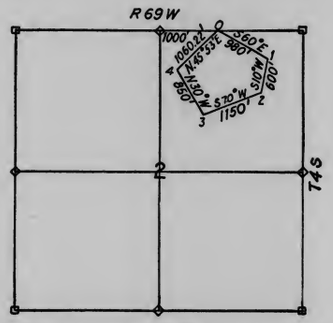


Fig. 84.—Metes and bounds tract.

post, etc. The boundary of the land is then defined as commencing at that point and going by courses and distances, preferably in a clockwise direction from point to point, and closing finally at the point of beginning. Oftentimes, the last course and distance does not meet the point of beginning. The description is, therefore, incorrect and is said "not to close." A good "metes and bounds" description will have the courses and distances close.

The number of acres included within the boundary lines of any described parcel of land should always be given. Figure 84 shows a tract of land described by metes and bounds, the legal description of which would read as follows:

Commencing at a point on the north line of Section 2, Township 4 South, Range 69 West, 6th Principal Meridian, 1,000 ft. East of the North ¼ corner of said Section 2; thence South 60° East, 980 ft.; thence South 10° West, 600 ft.; thence South 70° West, 1,150 ft.; thence North 30° West, 850 ft.; thence North

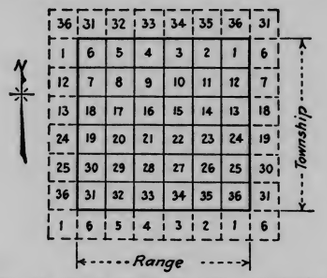


Fig. 85.—U. S. standard section numbering.

45° 53′ East, 1,060.22 ft. to point of beginning, said parcel of land containing 33.2 acres, more or less.

Figure 85 shows the method of numbering sections adopted by the United States government. Figure 86 shows the division

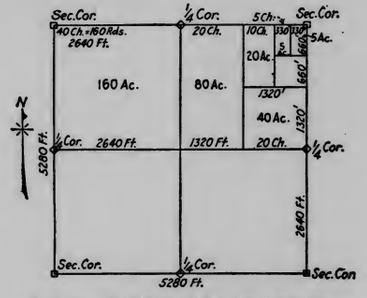


Fig. 86.—Division of standard section.

of a section (1 mile square) into tracts ranging from 5 to 160 acres or one-quarter section. The following tables will be of use to the appraiser:

TABLE 162.—SURVEYORS' CONVERSION TABLE

Chains	Feet	Chains	Feet	Chains	Feet	Chains	Feet	Feet	Links	Feet	Links	Feet	Links
1	66	26	1,716	51	3,366	76	5,016	0.1	0.15	17	25.758	42	63.635
2	132	27	1,782	52	3,432	77	5,082	0.2	0.30	18	27.273	43	65.152
3	198	28	1,848	53	3,498	78	5,148	0.3	0.45	19	28.788	44	66.667
4	264	29	1,914	54	3,564	79	5,214	0.4	0.61	20	30.303	45	68.182
5	330	30	1,980	55	3,630	80	5,280	0.5	0.76	21	31.818	46	69.697
6	396	31	2,046	56	3,696	81	5,346	0.6	0.91	22	33.333	47	71.212
7	462	32	2,112	57	3,762	82	5,412	0.7	1.06	23	34.848	48	72.727
8	528	33	2,178	58	3,828	83	5,478	0.8	1.21	24	36.364	49	74.242
9	594	34	2,244	59	3,894	84	5,544	0.9	1.36	25	37.879	50	75.758
10	660	35	2,310	60	3,960	85	5,610	1	1.515	26	39.394	51	77.273
11	726	36	2,376	61	4,026	86	5,676	2	3.030	27	40.909	52	78.788
12	792	37	2,442	62	4,092	87	5,742	3	4.545	28	42.424	53	80.303
13	858	38	2,508	63	4,158	88	5,808	4	6.061	29	43.939	54	81.818
14	924	39	2,574	64	4,224	89	5,874	5	7.576	30	45.454	55	83.333
15	990	40	2,640	65	4,290	90	5,940	6	9.091	31	46.970	56	84.848
16	1,056	41	2,706	66	4,356	91	6,006	7	10.605	32	48.485	57	86.364
17	1,122	42	2,772	67	4,422	92	6,072	8	12.120	33	50.—	58	87.879
18	1,188	43	2,838	68	4,488	93	6,138	9	13.635	34	51.515	59	89.394
19	1,254	44	2,904	69	4,554	94	6,204	10	15.152	35	53.030	60	90.909
20	1,320	45	2,970	70	4,620	95	6,270	11	16.667	36	54.545	61	92.424
21	1,386	46	3,036	71	4,686	96	6,336	12	18.182	37	56.061	62	93.939
22	1,452	47	3,102	72	4,752	97	6,402	13	19.697	38	57.576	63	95.454
23	1,518	48	3,168	73	4,818	98	6,468	14	21.212	39	59.091	64	96.970
24	1,584	49	3,234	74	4,884	99	6,534	15	22.727	40	60.606	65	98.485
25	1,650	50	3,300	75	4,950	100	6,600	16	24.242	41	62.120	66	100.—

Circumference of a circle equals diameter times 3.1416.

Area of a circle equals diameter times 0.7854.

Length of an arc equals number of degrees times 0.017453 radius.

The degree of a curve is determined by the central angle which is subtended by a chord of 100 ft.

The deflection angle of a curve is the angle formed at any point of same, between a tangent and a chord of 100 ft. and is one-half the degree of the curve.

The radius of a 1-deg. curve is 5,729.65 ft. The radius of any curve can be found by dividing this number by the number of degrees of the curve.

To read the length of a course between stations as marked by surveying, subtract the lower from the higher: 12 plus 52 from 17 plus 83 equals 5 plus 31, or 531 ft.

If no mention is made that the bearing is magnetic, it is understood to be true bearing (*i.e.*, true north).

TABLE 163.—LENGTH

Inches	Feet	Yards	Links	Rods, poles or perches	Chains	Miles
1	0.08333	0.02778	0.12630	0.00505	0.001263	0.00002
12.0	1	0.33333	1.51500	0.06061	0.01515	0.00019
36.0	3.0	1	4.54500	0.18180	0.04545	0.00057
7.92	0.66	0.22	1	0.04	0.01	0.00013
198.0	16.5	5.5	25.0	1	0.25	0.003125
792.0	66.0	22.0	100.0	4.0	1	0.0125
63,360.0	5,280.0	1,760.0	8,000.0	320.0	80.0	1

TABLE 164.—AREA

Square inches	Square feet	Square yards	Square rods	Square chains	Acres	Square miles or sections
1	0.006944	0.0_27716	0.0_42551	0.0_41594	0.0_41594	0.0_2491
144.0	1	0.1111	0.0_23673	0.0_42296	0.0_22296	0.0_73587
1,296.0	9.0	1	0.03306	0.0_32066	0.0_32066	0.0_43228
39,204.0	272.25	30.25	1	0.0625	0.07625	0.0_49766
627,264.0	4,356.0	484.0	16.0	1	0.10	0.0_21562
6,272,640.0	43,560.0	4,840.0	160.0	10.0	1	0.001562
	27,878,400.0	3,097,600.0	102,400.0	6,400.0	640.0	1

1 acre = 208.75 ft. square.

Lot, Block, Subdivision Description.—Figure 87 shows the method of dividing a twenty acre tract into a standard city

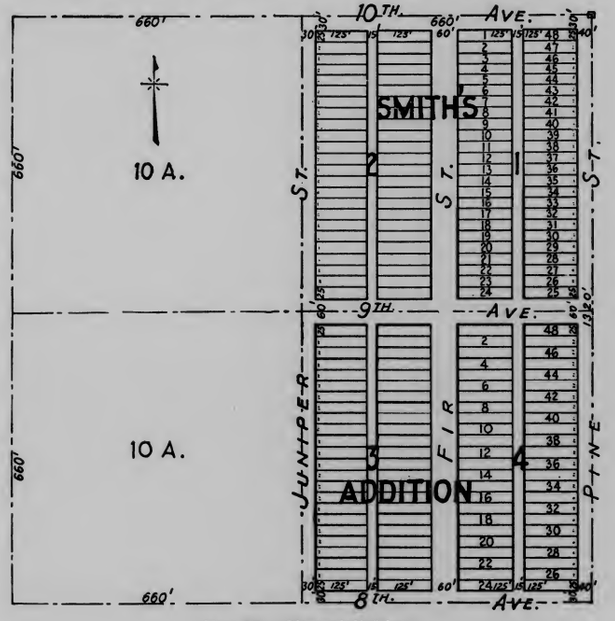


FIG. 87.—City subdivision.

subdivision in which the description of any parcel is defined by lot, block and subdivision.

Two lots shown in Fig. 87 might be described as lots 8 and 9, block 4, Smith's Addition.

The appraiser should check all legal descriptions very carefully. It may become necessary to measure the distance from the corner of the block to the property to secure a check on the location of the building. When a subdivided property is divided into two or more parcels by a line parallel with the street, it is called a "cut"; and when it is divided by a line parallel with the depth of the lot, it is called a "split." The new properties so divided should be carefully checked to see that the existing improvements are on the ground as legally described. Oftentimes alleys, parks or streets cut through the properties, and proper deductions should be made to prevent assessment against individuals for public owned properties.

Recording Data.—The appraiser should place check marks on the record card which, when complete, will give a complete description of the property being appraised. Careful attention should be given every detail because it will become a permanent record in the office of the assessor and be used as a basis for all taxes levied against the property. The information should be so complete that it will not be necessary to make a second trip to the property. When making a yearly inspection of the property, all additions and improvements affecting assessment value should be noted. Accurate information on land values, rentals and sales should be secured if possible.

Before leaving the property, the classification of the building and the cost per square foot or cubic foot should be noted. Additions for "extras" and deductions from standard should be itemized and valued. Any deviation from the standard cost should be noted and the reasons therefor given. The name of the owner and the address should be confirmed.

Making Corrections.—After the record cards are placed in the permanent file, no erasures should be made. All corrections should be made with colored ink above the original figures. If a building is moved or wrecked, or a new record card is made for a building, the old card should be marked "void" in red, the reason therefor given and the card preserved for future reference.

Incomplete Buildings.—If a building is not complete at the time of making the field appraisal, the PC or "per cent completion" of the building should be noted and the assessment made on that basis.

The scientific method for property valuation will not permit "guesses" to be made. All information secured and the results obtained by calculations, therefore, should be *bona fide* in every respect.

Department Specialists.—In large cities it is well to divide the work of appraising for taxation into departments with specialists at the head of each department. These departments may be listed as follows: building, land, machinery, merchandise, personalty, etc. Every field deputy should exercise care not to make statements which might embarrass his superiors and jeopardize his own standing and reputation as an appraiser. Statements relative to reduction in taxes, change in valuation or classification should refer the tax payer to the supervisor in charge.

Complaints.—All complaints should be referred to the head of the department involved; and if satisfactory settlement cannot be made the taxpayer has recourse as shown by the chart Fig. 91.

The Assessors' Use of Aerial Photographs.—Modern aerial photography has been put to many beneficial uses, one of the most recent and important of which is for the equalization of tax assessments. The first aerial photographs made for this purpose were taken in Middletown, Conn., and during recent years New York City, Kansas City, Newark and other cities have undertaken this kind of work.

In the assessment of rural properties for tax purposes the aerial photograph will show cultivated and non-cultivated land, and often the acreage can be calculated from scaled dimensions of fence lines shown in the photograph. It often happens that buildings are unnoticed by the assessor on the ground and the number and the approximate size of all improvements can generally be determined from the aerial photographs. Irrigated and non-irrigated land and the general character of the land can be distinguished by means of the aerial photograph. Figure 88 shows a rural section in Erie County, N. Y., photographed from the air. The scale is 1 in. = 800 ft. on the original negative.

Figure 89 gives an aerial view of a small town in Westchester County, N. Y. Practically every building can be seen under the stereoscope and magnifying glass. The scale is 1 in. = 600 ft. on the original negative. Figure 90 shows a city block where the dimensions have been written in. The plan dimensions of every building can be readily scaled from the photograph. All

aerial photographs are furnished through the courtesy of the Fairchild Aerial Surveys Inc., New York.

The entire city of New York has been mapped on a scale 1 in. = 600 ft., the work requiring almost a year's time. Where weather conditions are favorable, from 60 to 80 sq. miles of territory can be

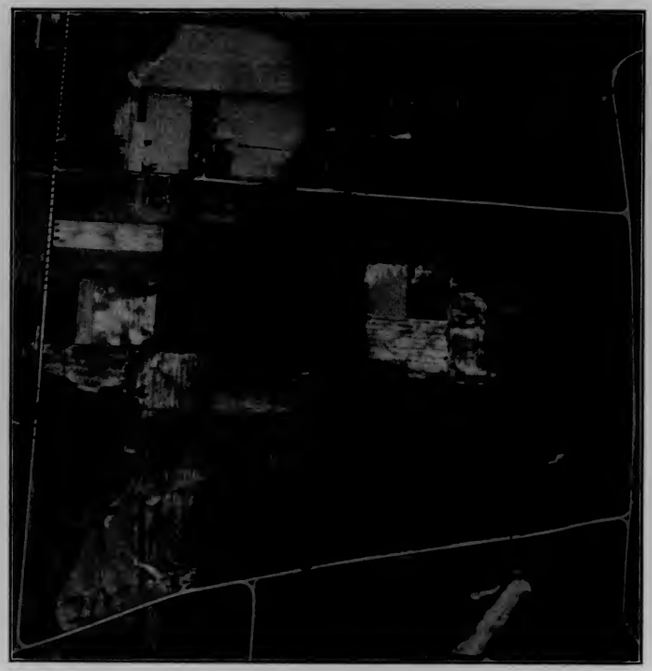


FIG. 88.—Aerial view, Erie County, N. Y.

aero-photographed in a day. One of the greatest handicaps to the aerial photographer is unsatisfactory weather conditions. In the eastern part of the United States an average of one day in seven is found to be satisfactory for aerial photography, while in the west the average is higher. The aerial photographer endeavors to overlap his photographs about 60 per cent on both

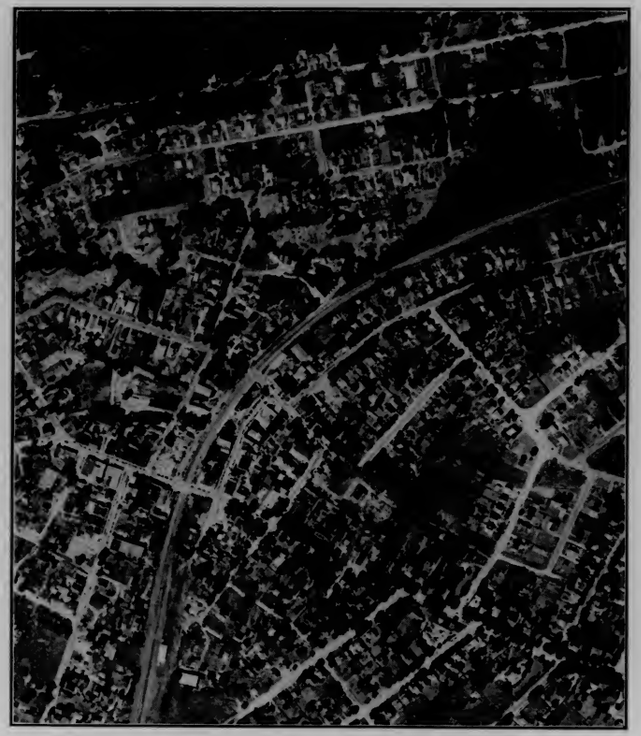


FIG. 89.—Aerial view, Westchester County, N. Y.

aerial photographs are furnished through the courtesy of the Fairchild Aerial Surveys Inc., New York.

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FIG. 89.—Aerial view, Westchester County, N. Y.

sides and ends and it requires considerable skill to match the photographs into one large photographic map. To complete such a map for an area of 100 sq. miles on a scale of 1 in. = 800 ft. to 1 in. = 1,000 ft. requires about 30 days. Aerial photographs for map making purposes are generally taken from a height of 2 to 3 miles above the ground.

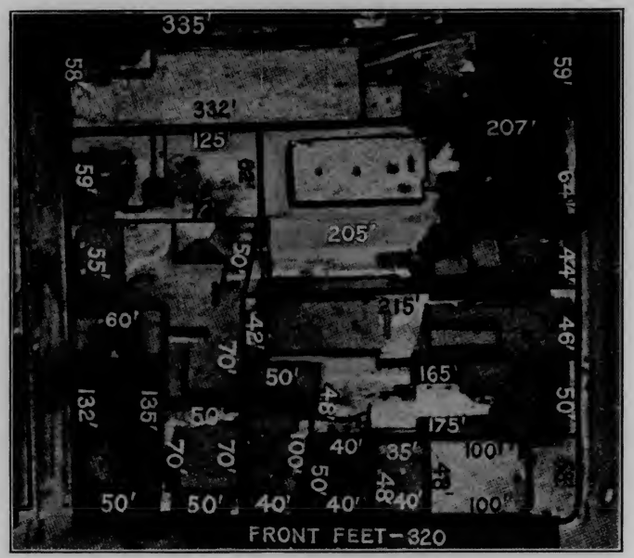


FIG. 90.—Aerial view, city block.

It is estimated that the cost of making an aerial photographic map on a scale of 1 in. = 800 ft. to 1 in. = 1,000 ft. varies from $150 to $200 per sq. mile which is about one-half the cost of doing the same work by ground survey. Some of the objections to aerial photographic maps are—height of buildings is not shown, brick and frame buildings cannot be distinguished, discrepancies in scale due to varying heights from which photographs were taken

CHAPTER XXI

ESTABLISHING A SYSTEM FOR LAND APPRAISALS

Land Appraisals.—The subject of scientific land appraising has been given much more consideration by the economists than the subject of scientific building appraisals. Many admirable treatises on the valuation of land have been written. A number of widely used systems have been invented by William A. Somers of St. Paul, John A. Zangerle of Cleveland, Judge Hoffman, Davies and Craigen of New York, Martin of Chicago, and Lindsey and Bernard of Baltimore. Every system thus far presented has its own individual merits as well as its defects. It is the aim of the authors to present herewith a system for land appraising which will represent the best features of other systems now in use. Few single systems can be recommended in their entirety because of their possible protechnical, impractical or unsound features. Any successful system of scientific land valuation must be easily understood and easily applied and have its appeal to the layman as well as to the appraiser.

Classification of Land.—The first important step in the determination of land value is its classification relative to location, use and quality.

A full knowledge of these three characteristics is essential for the proper classification and valuation of land, which may be more fully described as follows:

Location.

1. Urban.
2. Suburban.
3. Rural.

Use.

1. Residential.
2. Industrial.
3. Railroad.
4. Business.
5. Public.
6. Agricultural
7. Grazing.

sides and ends and it requires considerable skill to match the photographs into one large photographic map. To complete such a map for an area of 100 sq. miles on a scale of 1 in. = 800 ft. to 1 in. = 1,000 ft. requires about 30 days. Aerial photographs for map making purposes are generally taken from a height of 2 to 3 miles above the ground.

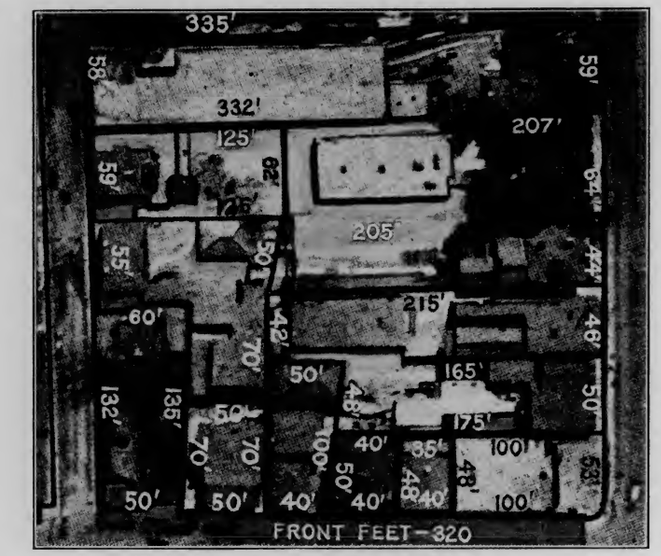


FIG. 90.—Aerial view, city block.

It is estimated that the cost of making an aerial photographic map on a scale of 1 in. = 800 ft. to 1 in. = 1,000 ft. varies from $150 to $200 per sq. mile which is about one-half the cost of doing the same work by ground survey. Some of the objections to aerial photographic maps are—height of buildings is not shown, brick and frame buildings cannot be distinguished, discrepancies in scale due to varying heights from which photographs were taken

CHAPTER XXI

ESTABLISHING A SYSTEM FOR LAND APPRAISALS

Land Appraisals.—The subject of scientific land appraising has been given much more consideration by the economists than the subject of scientific building appraisals. Many admirable treatises on the valuation of land have been written. A number of widely used systems have been invented by William A. Somers of St. Paul, John A. Zangerle of Cleveland, Judge Hoffman, Davies and Craigen of New York, Martin of Chicago, and Lindsey and Bernard of Baltimore. Every system thus far presented has its own individual merits as well as its defects. It is the aim of the authors to present herewith a system for land appraising which will represent the best features of other systems now in use. Few single systems can be recommended in their entirety because of their possible protechnical, impractical or unsound features. Any successful system of scientific land valuation must be easily understood and easily applied and have its appeal to the layman as well as to the appraiser.

Classification of Land.—The first important step in the determination of land value is its classification relative to location, use and quality.

A full knowledge of these three characteristics is essential for the proper classification and valuation of land, which may be more fully described as follows:

Location.

1. Urban.
2. Suburban.
3. Rural.

Use.

1. Residential.
2. Industrial.
3. Railroad.
4. Business.
5. Public.
6. Agricultural
7. Grazing.

8. Mining.
9. Private reserve.
10. Government reserve.

Quality.

1. Topographic features:
   (*a*) Flat.
   (*b*) Hilly or sloping.
   (*c*) Mountainous.
   (*d*) Draw, valley or ravine.
   (*e*) Slough or marsh.
   (*f*) Brush or wooded.
   (*g*) Rocky or barren.
   (*h*) Springs or water courses.
   (*i*) Dry or irrigated.
2. Soil features:
   (*a*) Poor, barren or rocky.
   (*b*) Fair.
   (*c*) Good, fertile or productive.

An analysis of the classification of land is given in the following table:

TABLE 165.—CLASSIFICATION OF LAND

		Location		
		Urbe	Suburban	Rural
Use	Residential	Poor, fair, good, excellent	Poor, fair, good, excellent	Poor, fair, good, excellent
	Industrial	" " "	" " "	" " "
	Railroad	Trackage, terminal station, round-house	Trackage or station	Trackage
	Business	Poor, fair, good, excellent	Poor, fair, good, excellent	
	Public	Streets, alleys, playground, parks, buildings	Streets, alleys, parks, playground, buildings	Highways
	Agricultural	.....	Poor, fair, good, excellent	Poor, fair, good, excellent
	Grazing	.....	" " "	" " "
	Mining and oil	Productive or non-productive oil, gold, silver, etc.	Productive or non-productive, oil, gold, silver, etc.	Productive or non-productive, oil, gold, silver, etc.
	Private reserve	Game, timber, bird, etc.	Game, timber, bird, etc.	Game, timber, bird, etc.
	Government	Park, forest, power, water, oil, mineral, etc.	Park, forest, power, water, oil, mineral, etc.	Park, forest, power, water, oil, mineral, etc.
Quality — Topographic features	Subsurface	Fill or solid, rock, sand, clay, etc.		
	Surface relative to contour	Flat, hilly, sloping or mountainous; draw, valley or ravine		
	Surface relative to water	Slough or marsh, springs and water courses, dry or irrigated		
	Surface relative to natural growths	Grass, brush, wooded or commercial timber		
Soil features	Non-productive	Poor, barren or rocky		
	Productive	Poor, fair, good or excellent, non-fertile or fertile, rocky, sandy, clay or loam		

The value of any parcel of land is determined by a variable number of factors which may be considered as assets or liabilities. It is impossible to present herewith a study of every factor of value. The following table, however, lists 79 factors together with the probable influence as an asset or a liability on various improved properties. Factors affecting value may be divided into six groups as follows:

1. Topography and elements of nature.
2. Location and improvements.
3. Zoning, height, area and use.
4. Supply and demand.
5. Human characteristics.
6. Finances.

TABLE 166.—LAND VALUE FACTORS

		Cheap residences, flats, tenements, terraces	Middle-class residences, flats, tenements, terraces, etc.	High-class residences	Cheap hotels and apartments	Middle-class hotels and apartments	High-class hotels, business district	High-class hotels and apts., residence district	Bank and office buildings	Cheap stores	Middle-class stores	High-class retail and department stores	Wholesale and commission buildings	Warehouses	Factories	Lofts	Theatres	Orphanages	Hospitals	Churches	Public buildings	Fraternal buildings	Public garages	Filling or auto service stations	Farm residences
Topography and elements of nature	Level with street	A_1	A_1	....	A_1	A_1	A_1	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	....	....	....	A_1	A_1	A_1	A_1	
	Below level of street	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2	L_2	L_1
	Slightly above level of street, 2 ft.	....	....	A_2	....	....	L_2	A_1	L_3	....	....	L_2	L_2	L_2	....	L_2	....	A_2	A_2	A_1	....	....	....	....	A_2
	Considerably above level of street	L_2	L_2	A_1	L_1	L_1	L_1	L_2	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2	L_2	L_1	L_1	L_1	L_1	L_1	A_1
	Sloping hillside	L_2	L_2	V	L_2	L_2	L_1	L_1	L_1	L^2	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2
	Ravines & marshes	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2
	Steep street grades	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2
	Adjacent to water course	L_2	L_3	A_2	V	V	V	A_2	L_2	V	L_2	L_1	V	V	A_2	L_2	L_2	L_2	A_2	A_3	V	V	V	A_2	A_1
	Near lake or ocean	A_2	A_2	A_1	A_1	A_1	A_1	A_1	L_2	A_2	A_2	L_2	L_2	L_2	A_2	L_1	A_2	A_2	A_2	A_2	A_2	L_2	A_2	A_2	A_1
	Near scenic points attracting tourists	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_2	A_2	A_2	A_2	A_1	A_2	A_1	A_1	A_1	A_2	A_1	A_1	V
	In zones of natural disturbance such as hurricanes, earthquakes, floods, tornadoes	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1
Location & improvement	Corner location	A_2	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_2	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	V
	Long blocks	L_2	L_1	L_1	L_2	L_2	L_2	L_2	L_2	L_2	L_2	L_2	L_2	V	L_2	L_2	A_2	A_2	V	A_2	V	V	A_2	A_2	A
	Narrow streets 40 ft. or less	L_2	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2
	Wide streets 100 ft. or more	L_2	A_2	A_2	A_2	A_2	A_2	A_1	A_2	A_2	A_2	A_2	A_2	A_2	A_2	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	V
	Dead-end streets	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2	L_1	L_1	A_1	A_1	L_1	L_1	L_1	L_1	L_1	V
	Curved streets	L_2	L_2	V	L_2	L_2	L_2	V	L_2	L_2	L_2	L_1	L_1	L_2	L_1	L_1	L_2	L_2	L_2	L_2	L_1	L_2	V	V	
	Straight streets	A_1	A_1	V	A_1	A_1	A_1	V	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	V	V	
	Fronting on heavy traffic streets	L_2	L_1	L_1	L_2	L_2	L_2	L_2	A_1	A_1	A_1	A_1	L_1	L_1	L_2	L_2	L_2	L_1	L_1	L_2	L_2	L_2	A_1	A_1	A_1
	Fronting on surface or elev. R. R. lines	L_2	L_1	L_1	L_1	L_1	L_1	L_1	A_1	A_1	A_1	A_1	A_1	A_2	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1
	A short distance from sur. elev. & R. R. lines	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_2	L_2	L_2	L_2	L_1	L_1	L_1	L_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Fronting on parks	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	L_2	L_1	L_1	L_1	L_1	L_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Fronting on main boulevard	L_2	L_1	L_1	L_2	L_2	L_2	L_2	A_1	A_1	A_1	A_1	L_1	L_1	L_2	L_2	L_2	L_1	L_1	A_1	A_1	A_1	A_1	A_1	A_1
Location & improvements	Short distance from main boulevard	A_1	A_1	A_1	L_2	L_1	L_1	L_1	L_1	L_2	L_1	L_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	L_2	L_1	L_1	L_1	L_1	L_2
	Easy access to business center	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Good R. R. shipping facilities adjoining	L_2	L_1	L_1	L_2	L_1	L_1	L_1	L_1	V	L_2	L_1	A_1	A_1	A_1	A_1	L_2	L_1	L_1	L_1	L_1	L_1	V	V	L_2
	Good water shipping facilities adjoining	L_2	L_1	L_1	L_2	L_1	L_1	L_1	L_1	V	L_2	L_1	A_1	A_1	A_1	A_1	L_1	L_1	L_1	L_1	L_1	L_1	V	....	A_1
	Paved & curbed streets	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Sidewalks	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Sewers, water, gas, electricity, telephone	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Near subway entrance	A_2	L_2	L_1	A_2	A_2	L_2	L_1	L_1	A_1	A_2	A_2	A_2	A_2	A_2	L_2	L_1	L_1	L_1	L_2	L_1	A_1	A_1		
	Irregular skyline of buildings	V	V	A_1	V	V	V	A_1	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V
	Small area of site	L_2	L_2	L_1	L_2	L_2	L_2	L_2	V	L_2	L_1	L_2	L_2	L_1	L_2	L_1	L_1	L_1	L_1	L_1	L_2	L_2	L_1	L_1
	Large area of site	A_2	A_2	A_1	A_2	A_1	A_1	A_1	A_2	A_2	A_1	A_1	A_1	A_1	A_2	A_1	A_1	A_1	A_1	A_1	A_2	A_2	A_1	A_1
	Shallow lot	L_1	L_1	L_1	L_2	L_2	L_1	L_1	L_1	V	L_2	L_1	L_1	L_1	L_1	L_2	L_1	L_1	L_1	L_1	L_1	L_1	V	L_1
	Deep lot	A_2	A_1	A_1	V	A_2	A_1	A_1	A_2	V	V	A_1	A_1	A_1	A_1	V	A_1	A_1	A_1	A_1	A_1	A_1	V	A_1
	Area way for delivery of goods	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Plottage	V	V	V	V	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	V
	Rectangular shape of site	A_2	A_2	V	A_1	A_1	A_1	V	A_1	A_1	A_1	A_1	A_1	A_1	V	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Irregular building line in block	L_2	L_2	V	L_2	L_1	L_1	V	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2	L_2	L_2	V	L_2	L_2	V
	Vacant unimproved adjacent land	L_2	L_2	L_1	L_2	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	V	L	L_2	A_2	A_2	L_1	L_2	L_2	L_2	L_1
	Zoned for residences	A_1	A_1	A_1	A_1	A_1	....	A_1	L_1	V	L_1	L_1	L_1	V	L_1	L_1	V	A_1	A_1	A_1	V	V	V	V	
	Zoned for industry	V	L_2	L_1	L_2	L_1	L_1	L_1	L_1	V	L_2	L_1	A_1	A_1	A_1	A_1	L_1	L_1	L_1	L_1	L_1	L_1	V	V	
	Zoned for business	V	V	L_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	V_1	A_1	A_1	L_1	L_1	L_1	A_1	A_1	A_1	A_1	
	Nuisances	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1
	Next to theatre, school, church, public bldg	L_2	L_2	L_1	L_2	L_2	L_1	L_1	L_1	L_1	V	V	L_1	L_1	L_1	L_1	A	L_1	L_1	A_1	A_1	A_1	L_1	L_1	A_1

TABLE 166.—LAND VALUE FACTORS.—(*Continued*)

		Cheap residences, flats, tenements, terraces, etc.	Middle-class residences, flats, tenements, terraces, etc.	High-class residences	Cheap hotels and apartments	Middle-class hotels and apartments	High-class hotels, business district	High-class hotels and apts. residence district	Bank and office buildings	Cheap stores	Middle-class stores	High-class retail and department stores	Wholesale and commission buildings	Warehouses	Factories	Lofts	Theatres	Orphanages	Hospitals	Churches	Public buildings	Fraternal buildings	Public garages	Filling or auto service stations	Farm residences
Zoning, height, area and use	Short distance from theatres, schools, churches, & public bldgs	A_1	A_1	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	L_2	L_2	L_2	L_3	A_1	A_2	A_1	A_1	A_1	A_1	L_2	L_2	A_1
	Near factory	A_2	L_2	L_1	A_1	L_2	L_1	L_1	L_1	A_1	L_2	L_1	A_2	A_2	A_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_2	L_3	L_3	L_3
	Near tenements and cheap apartments	A_1	L_1	L_1	A_1	L_1	L_1	L_1	L_1	A_1	L_2	L_1	A_2	A_2	A_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_3	L_3	L_3	L_3
	Near hospital	A_2	A_2	L_2	L_1	L_1	L_1	L_2	L_1	A_2	L_2	L_1	L_1	L_1	L_1	L_1	L_1	L_1	A_1	A_2	L_1	L_1	L_2	L_2	L_2	L_1
	Near cemetery	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1
	Near park	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	V	V	L_2	L_2	A_2	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Near auto serv. sta	L_2	L_2	L_1	L_1	L_1	L_1	L_1	L_1	A_2	L_2	L_1	A_2	A_2	A_2	L_1	A_2	L_2	L_1	L_1	L_1	L_1	A_1	A_1	A_1	A_1
	Near airport	A_2	A_2	L_1	A_2	L_2	L_1	L_1	L_1	A_2	L_2	L_1	L_1	L_2	L_2	L_1	L_1	L_1	L_1	L_1	L_1	L_1	A_1	A_1	A_1	A_2
	Near chain store	A_1	A_1	L_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	L_2	L_2	L_2	A_2	A_1	L_2	L_1	L_1	L_1	A_2	A_2	A_1	A_1	
	Well-defined business dist. such as furniture dist., wholesale dist., etc	A_1	L_1	L_1	A_1	A_1	A_1	L_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	L_2	L_1	V	L_2	L_2	A_1	A_1		
	Similarity of surrounding bldg. in architecture & use	V	A_1	A_2	V	A_1	A_1	A_1	A_1	L_1	L_2	A_2	A_1	A_1	L_2	A_2	A_2	A_2	A_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Traffic regulations	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
Relative to supply and demand	Near source of supply of raw materials used in manufacturing	V	V	V	V	L_2	L_1	L_1	L_1	V	L_2	L_1	L_1	A_1	A_1	A_1	L_2	L_2	L_1	L_1	L_2	L_1	L_2	A_1	A_1
	Near source of food supply	V	V	V	V	V	V	V	L_2	V	L_2	L_1	A_1	A_1	A_1	L_2	L_1	A_1	A_1	L_2	L_1	L_1	V	V	A_1
	Near good supply of skilled labor	A_1	V	V	A_1	V	V	V	V	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	V	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Near market for manufactured products	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	City built up largely by single manfactured product	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V	V

Relative to human characteristics	Neighborhood having similar religious, fraternal, and social affiliations	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	V	V	V	V	V	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Near or in racial settlements	A_2	L_2	L_1	A_2	L_2	L_1	L_1	L_1	A_1	V	L_1	V	V	A_2	V	V	V	V_1	A_1	L_1	L_1	A_2	A_1	V
	Restriction of immigration	V	A_2	A_1	V	A_2	A_1	A_1	V	V	L_2	L_1	V	V	V	V	L_2	A_2	A_1	V	A_2	A_2	V	V	L_2
	Labor disputes	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1
	Private restrictions on land	L_1	V	A_1	L_1	A_1	A_1	A_1	V	A_1	A_2	L_1	L_1	L_1	A_2	V	V	V	A_2	A_1	A_1	L_2	L_2	V	
	Clean streets and alleys	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
Relative to finances	Neighborhood in which wealthy people predominate	L_2	A_2	A_1	L_2	A_1	A_1	A_1	A_1	L_2	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Tenant occupancy	A_2	L_2	L_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	L_2	L_2	L_1	A_1	L_1	L_1	A_1	....	....	V	L_1	L_1	L_1
	Owner occupancy	....	A_1	A_1	....	....	....	....	A_1	A_1	A_1	A_1	A_1	A_1	A_1	....	A_1	A_1	....	....	....	V	A_1	A_1	A_1
	In high-rent district	L_1	L_1	A_1	L_1	L_2	A_2	A_1	A_1	L_1	L_2	A_1	L_1	L_1	L_1	L_1	A_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1
	In low-rent district	A_1	A_1	L_1	A_1	A_2	L_1	L_1	L_1	A_1	A_2	L_1	A_1	A_1	A_1	A_1	L_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1
	Short lease, 1 to 10 yr	A_1	A_1	A_1	A_1	L_2	L_1	L_1	L_1	A_1	A_1	L_1	A_1	A_1	L_1	L_1	A_1	V	L_1	....	....	L_1	A_1	A_1	A_1
	Long lease, 10 to 99 yr	L_1	L_1	L_1	L_1	A_1	A_1	A_1	A_1	L_1	L_1	A_1	L_1	L_1	A_1	A_1	L_1	V	A_1	....	....	A_1	L_1	L_1	L_1
	High local taxes	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	L_1	V	L_1	L_1	L_1	L_1
	Satisfactory service and rates from public ser. companies	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1	A_1

A_1 = asset, very desirable.
A_2 = asset, desirable.
A_3 = asset, of little value.

L_1 = liability, very undesirable.
L_2 = liability, undesirable.
L_3 = liability of little consequence.

V = may be either an asset or a liability.

Tax Levy and Tax Adjustment Processes.—The chart (Fig. 91) shows graphically a suggested standard system for use in the levying and adjusting of taxes. Each state differs from others

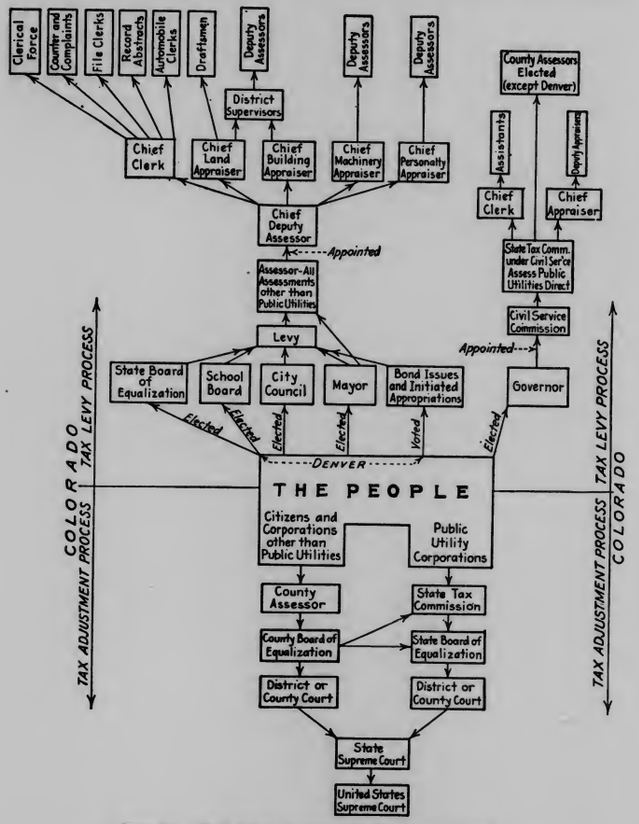


FIG. 91.—Tax Assessment and adjustment chart.

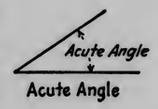
somewhat in the methods used. The chart is based largely on the Denver system and may be altered in detail for use in local assessors' manuals. The authors realize that the chart is subject to discussion and criticism, and it is presented here with the hope

that it may be helpful in the development of an efficient and logical system for handling local tax matters.

Definitions of Terms Used in the Valuation of Land.

Acre. A unit of land area containing 43,560 sq. ft. or $\frac{1}{640}$ of a theoretical section or square mile.

Acute Angle. An angle less than a right angle and containing less than 90 degrees.



Addition. A tract of land subdivided into lots, plots, blocks, streets, alleys, parks, reserved strips, acres, tracts, etc., which is designated by name and legally accepted by constituted authorities.

Alley. A public thoroughfare affording access to the rear of a lot.

Alley Influence. The increment of value added to a lot due to the accessibility afforded by an alley.

Assembly Value. See Plottage.

Assessed Value. The value of property fixed by the assessor upon which taxes must be paid.

Base Line. An east and west line used as a basis for establishing township lines.

Base Value. The value of a unit area of land one foot wide, having a depth equal to the standard depth of lots in the community.

Block. A group of lots enclosed in a single square or the like, and bounded by public streets.

Capitalized Gross Income. The value of a property determined by dividing the gross annual return from a property by a given percentage.

Capitalized Net Income. The value of a property determined by dividing the net annual return (gross return minus expenses) etc., from the property by a given percentage.

City Plan. A legally adopted plan regulating the future growth and development of a city.

Condemnation. The act of securing legal title to private property for public uses by means of court procedure with compensation stipulated.

Corner Influence. The increment of value added to a corner property and properties adjacent thereto, due to the proximity of an intersecting street.

Cut. The subdivision of a lot into two parcels by a line running across the lot in a direction parallel with the street line.

Dead-end Street. A street closed to through traffic.

Depth Curve. A curve plotted to show the value relationship existing between units of land located at various distances from the front of a lot or street line.

Easement. A legal right aside from ownership to the freedom or use of another's land.

Eminent Domain. The sovereign right of governmental agencies to acquire land for public purposes by making compensation.

Equalization. The payment of taxes in direct proportion to the value of all properties within the community.

Excess Condemnation. The act of securing legal title to property immediately adjoining or adjacent to that being condemned for public use by means of court procedure.

Factor of Value. An existing condition influencing value.

Front Foot. A lot area unit one foot in width and equal to the depth of the lot measured back from the street and perpendicular thereto.

Full Cash Value. The cash amount which a buyer who does not have to buy is willing to pay a seller who does not have to sell, both parties being willing.

Graded Tax. A system whereby all classes of propertiy do not share equally in the payment of taxes relative to property value.

Improved Land. Land upon which buildings, fences or other improvements have been constructed.

Increment of Value. A value added over and above the base value.

Interior Site. Land located in the interior of a block and more than 100 ft. from the corners thereof.

Land Line. A line dividing two legal subdivisions of land.

Land Value Map. A map on which base values of land are shown.

Lease. A right to the use of property given by the owner for a definite period of time.

Legal Description. The description of a parcel of land by which the ownership is legally recorded by constituted authority.

Line of Coincidence. An imaginary line between two parallel streets or two streets having similar directions indicating the points of equal value calculated from both street frontages.

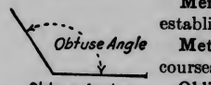
Local Improvements. Improvements to property generally consisting of one or more of the following items:

1. Sanitary sewers.
2. Storm sewers.
3. Macadamized or paved streets.
4. Sidewalks.
5. Graded streets.
6. Street lighting.
7. Alley paving.
8. Curbing.
9. Street widening.
10. Water.
11. Electricity.
12. Gas.
13. Telephone.

Lot. 1. The smallest unit of a subdivided tract. 2. Tracts of land 40 acres more or less in area adjoining the north line of sections 1 to 6 inclusive, and the west line of sections 7, 18, 19, 30 and 31.

Lot and Block Map. A map showing the lots, blocks, subdivisions, streets and alleys together with the dimensions of the same.

Merge Line. See Line of Coincidence.



Obtuse Angle

Meridian. A north and south line used as a base for establishing range lines.

Metes and Bounds. A legal description given by courses and distances.

Oblique Angle. Any angle other than a straight or right angle.

Obtuse Angle. An angle greater than a right angle and containing more than 90 and less than 180 deg.

One-quarter Corner. A corner located on a section line one-half way between section corners as established by the United States government.

Overlap Value. The increment of value added to interior lots due to the proximity of an intersecting street and being 100 ft. or more therefrom.

Parallelogram. A figure having four sides with its opposite sides parallel.

Pedestrian Count. The systematic enumeration of the number of people passing given locations during a certain period of time.

Parallelogram

Plot. See Lot.

Plottage. The assemblage of a number of adjacent lots into a larger unit.

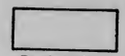
Plottage Value. The increment of value resulting from plottage.

Private Alley. A thoroughfare, privately owned, affording access to the rear of a lot.

Range. The area included between two range lines.

Range Lines. A north and south line used as a basis for establishing sections.

Real Estate. Land and other factors thereon, either natural or artificial, existing under or upon land and considered a part thereof.


Rectangle

Rectangle. A figure having four sides with its opposite sides parallel and all interior angles right angles.

Reflected Value. The increment of value added to lots due to the proximity of value producing property or buildings on adjoining or adjacent property.

Reflex Angle. An angle greater than a straight angle and containing more than 180 and less than 360 deg.

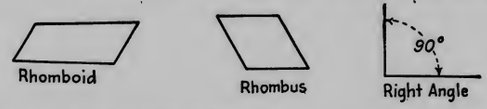
Regional Plan. A legally adopted plan regulating the growth and development of a city and its environs.

Reserved Strip. A strip of land within a platted subdivision reserved by the owner for specific purposes at the time of the filing of the subdivision.

Restricted Lots. Lots restricted by deed as to future sales, uses and construction of improvements.

Rhomboid. A figure having four sides with its opposite sides parallel and all interior angles oblique angles.

Rhombus. A figure having four equal sides with its opposite sides parallel



and all interior angles oblique angles.

Right Angle. The angle between two lines perpendicular to each other and containing 90 deg.

Rural. Land in the country.

Section (theoretical). A square parcel of land having a length of one mile or 5,280 ft. on each side.

Section Corner. A corner marking the intersection of two section lines as established by the United States government.

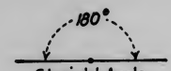
Section Line. A line dividing two sections.

Single Tax. A system of general revenue taxation whereby land only is taxed.

Split. The subdivision of a lot into two parcels by a line running parallel with the depth of the lot.

Square. 1. A figure having four equal sides with its opposite sides parallel and all interior angles right angles. 2. An area containing 100 sq. ft.

Square



Straight Angle

Straight Angle. The angle revolved about a straight line and containing 180 degrees.

Street. A public thoroughfare affording access to the adjacent property.

Standard Lot. The most representative lot in size of all lots within a community.

Subdivision. See Addition.

Suburban. Land adjacent to or adjoining an incorporated city.

Traffic Count. The systematic enumeration of the vehicles passing given localities for a certain period of time.

Township (theoretical). The area included between two township lines and two range lines and containing 36 sq. miles.

Township Line. An east and west line used as a basis for establishing sections.

Trapezium. A figure having four sides with no two sides parallel.

Trapezium

Trapezoid

Trapezoid. A figure having four sides with only two sides parallel.

True Value. See Full Value.

Unimproved Land. Land upon which no improvements have been constructed by man or placed by nature.

Unit Foot. A lot area unit one foot in width and of standard depth (*e.g.*, 100 ft.) measured back from the street and perpendicular thereto.

Unit Foot Value Map. A map on which unit foot values for land are shown.

Utility. The use to which a property is put.

Width of Lot. The platted dimension of a lot paralleling the street.

Zoning. Legally adopted rules for the regulation of height, use and area of a building.

Method for Determination of Land Values.—Satisfactory methods for the determination of land values may be evolved by applying processes which have proved satisfactory in many of the larger cities of the country. A number of factors enter into the value of land, most of which are shown in Table 165. In determining land values the following procedure is recommended:

1. Preparation of lot and block maps for the entire city upon which base values and lot values are shown.
2. Secure all available data on actual sales and transfers where the consideration is given or can be determined from authoritative sources.
3. Establish a land value unit.
4. Consult with citizens, taxpayers, realtors, bankers, etc., and establish base values.
5. Fix the point of highest value in the city and call it 100 per cent or give it a monetary value per unit. Relate all other figures on city land values to this 100 per cent figure.
6. Establish rules for one street influence, two street influence, corner influence, alley influence, overlap, triangular lots, irregular lots, curved front lots, etc.
7. Check legal description and figure land values for all lots.

Establishing a Land Value Unit.—The determination of the unit of land value will depend largely upon the practice adopted in individual cities for the standard depth of lots. In many cities practically all of the lots used for both residential and business purposes are 100 ft. in depth, but in other cities the major portion of the lots are 120, 125 and 150 ft. in depth, and these should be accepted as the standard.

When speaking of "unit foot" and "front foot" values now commonly used in practice, the appraiser is likely to be confused when he associates these terms with a parcel of land 1 ft. in width and 100 ft. deep in one instance and a parcel 1 ft. in width with variable depths in the other instance. On account of the fact that a great number of cities do not have 100 ft. standard depth lots, it is necessary that the term "base value" be understood to mean the value expressed in dollars and cents of a parcel of land having a width of one foot and a depth equal to the standard depth of lots as found in the majority of subdivisions in the city under consideration. This base value will be used as a basis from which deductions will be made for short lots and to which additions will be made for long lots, corner influence, alley influence, etc. The term "base value" is easily understood and cannot be confused with other forms of value expression.

It is a term which can be most easily expressed in meeting each individual local condition. All basic values of subdivided lots should be expressed in terms of "base value" except for industrial property where "square foot value" may be used. All basic values of unsubdivided or unplatted land should be expressed in terms of "acre value" or "square foot" value.

Base Value Maps.—The city should first be divided into assessment districts each of which may be readily and efficiently

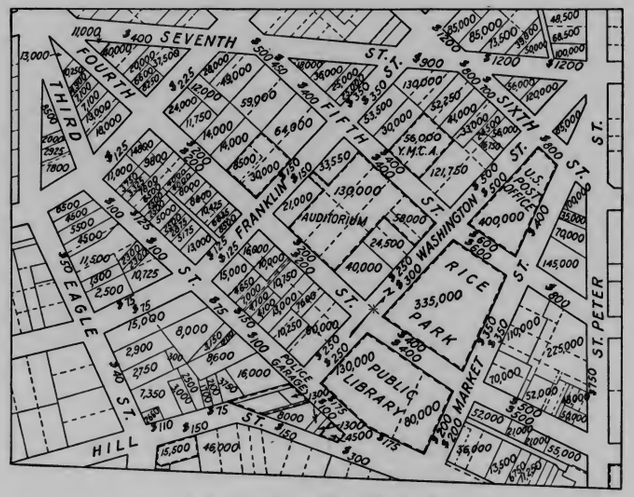


FIG. 92.—St. Paul base value map.

covered by a district supervisor and his deputy assessors. Each district should contain from 5,000 to 8,000 parcels depending upon the character of the improvements in the district and the number of deputy assessors employed. District boundaries should be selected so that the classification and types of buildings contained therein should be similar, if possible. Base value maps should be prepared for each district. These should show all lots, blocks, subdivisions and unplatted ground together with the dimensions of same. In the preparation of base value maps the local improvement district, zoning and other maps may be of considerable help.

The scale of base value maps may vary from 1 in. = 50 ft. to 1 in. = 100 ft., and the size should be about 24, by 30 in. or larger, to suit the convenience for handling and filing. The maps should be white prints on paper or linen, preferably linen, placed in loose-leaf binders. Revisions in land values can be readily made at small expense by the insertion of revised sheets. The old original maps should not be destroyed but be carefully filed for ready reference.

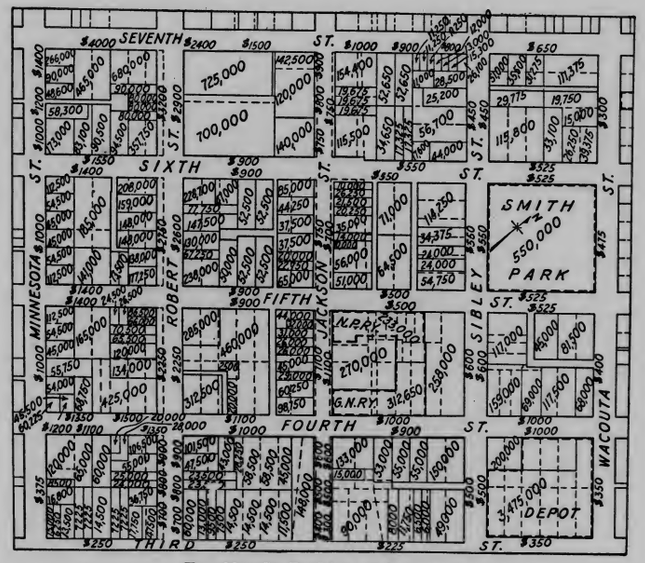


FIG. 93.—St. Paul base value map.

Base value maps for several sections in the city of St. Paul are shown in Figs. 92 and 93.

Several cities have made two sets of maps, one called the Lot and Block Map showing the lots, blocks and subdivisions together with their dimensions, and the other called the Unit Foot Value Map which omits the lots and dimensions and permits the insertion of unit foot land value figures on the street frontages. There is no apparent reason why the two sets of maps cannot be combined effectively into what may be called the Land Value

Map upon which all the required information relative to each parcel of land, its dimensions and value may be shown, together with all base values used in the deduction of the same.

Sources of Information.—Whenever it is possible to do so, the assessors' office should tabulate and file all the authorative information relative to land values which can be secured from newspaper advertisements and news articles, deeds and transfers of record which give the actual consideration, personal knowledge gained through associations with buyers and sellers of real estate and from other sources.

The Realtor.—No group of men is better qualified to assist the assessor in the work of establishing land values than the realtors and the fullest cooperation of the local real estate board should be sought by the assessor. In large cities realtors often specialize in properties located in certain districts and the assessor should ask the real estate board to appoint committees to work with him in establishing land values throughout the city. The various committees composed of from two to five members each should be selected with the understanding that they are to assist in the valuation of land in a certain district of the city in which they are acknowledged specialists. They will naturally be expected to place before the assessor much valuable first-hand information which they have acquired as a result of years of experience.

Other local business men, property owners, improvement associations or individuals should be allowed to present information before members of the district committee of realtors and the assessor, and this information should be given due and proper consideration. The committee should make its recommendations of value to the assessor, who, of course, may either accept or reject them. Unless due and sufficient cause for change in the base values submitted can be given by the assessor, the values as recommended should be accepted and used as the base values for the computation of land values.

The cooperation of the chamber of commerce and other business organizations and service clubs should be encouraged by the assessors, and all the publicity possible, through the daily press, will be tremendously helpful to the assessor in the development of his public relations program.

The Starting Point.—Land values are relative values and the value of any parcel of land is directly or indirectly associated with

the value of every other parcel of land in the community. The development and increase or decrease in land value is not necessarily the result of factors of value found within the confines of the lot itself, irrespective of outside influences, but its present-day value may be the result of exterior value forces working silently but effectively to create new value or destroy present value.

If, therefore, we can determine the value of the most valuable lot in any community, we should by various means be able to express the values of all the other lots in the community as a percentage of the high-value lot. This process is logical and reasonable. Real estate values are always determined by a deductive comparison process.

Generally, there is little doubt in the minds of those who are well informed on the realty values as to the location of the site having the highest local value in the city.

Two processes may be used by the appraisers in arriving at the value of land: (1) The highest value site is rated at 100 per cent, and all other base values are expressed as a percentage of this value. After this process has been completed for the entire community, the monetary base value of the 100 per cent site is determined from which all other base values may be readily ascertained. (2) All land values are expressed directly by their base value in dollars, keeping in mind their value as compared with the highest valued site.

Both processes arrive at the same result, and either may be used at the discretion of the appraisers. In either case all values must be expressed as the base value in which all lots are considered to be standard in depth.

The base value will often be a calculated value, where additions or deductions have been made allowing for long lots, short lots, corner influence, etc.

Population of Cities.—Several efforts have been made by a number of appraisers to determine the direct relationship existing between population and property value. No one will deny that as a general rule realty values increase with the increase in population. There are, however, so many contingent conditions influencing property values that any assumed direct ratio of property values to increase of population can, at best, give only a rough, unprovable estimate of property values (see Table 167).

Let us consider several phases of the question by assuming two cities having the same population at a certain time and yet having

unequal property values, which may be caused by one or more of the following factors:

1. Topography.
2. Type of city.
3. Type of people.
4. Past and future growth.

The topographical features of a city may largely determine property values irrespective of population. Cities hampered in growth by water or mountain barriers concentrate their values in limited territory, whereas cities which have unlimited area in which to grow will find their realty values spread over a large territory. In the first case we will find much higher concentrated realty values than in the second case.

The "type" of a city may have a decided influence upon realty values irrespective of population. The cities which are financial and trade centers will have greater concentrated realty values than cities which depend largely upon manufacturing and agriculture.

Cultural cities of wealth and American heritage will have greater concentrated realty values than cities having the same population consisting of foreign and racial settlements.

The three factors previously mentioned, together with many other factors, largely determine the past and future growth of a city. Cities having the same population today may show, upon analysis, that the growth of one has been dormant for ten years past and that the same factors of value which have brought about that condition are still effectively at work, while the other city may have shown a healthy growth during the past ten years through the development of factors favorable to growth, and the prospects may be that the same factors will accentuate and accelerate the increase in property values in the coming decade. In the first instance property values will probably be from 60 to 90 per cent of the values existing in the last mentioned city.

These facts tend to prove that no exact relationship can exist between population and property values for cities of equal population.

The following table shows the variation in property values relative to population for the cities of the United States having a population of 300,000 or more. The cities have been grouped according to population:

TABLE 167.—VARIATION IN PROPERTY VALUES, CITIES OF SIMILAR SIZE

City	Population (1926)	Per cent	Assessed value of realty 100% basis	Per cent
Group One				
Kansas City	383,100	100	$ 302,074,000	100
Indianapolis	374,300	98	425,364,000	141
Portland, Ore.	340,740	89	338,462,000	112
Rochester	324,500	85	499,780,000	165
Jersey City	321,500	84	595,604,000	197
Louisville	320,100	84	273,735,000	91
Toledo	305,400	80	391,766,000	130
Group Two				
Newark	466,700	100	617,534,000	100
Minneapolis	447,700	96	652,202,000	106
Cincinnati	412,200	88	733,318,000	119
Seattle	411,500	88	402,931,000	65
Group Three				
San Francisco	576,000	100	601,735,000	100
Buffalo	550,000	95	990,039,000	165
Washington	540,000	94	905,476,000	151
Milwaukee	536,400	93	640,302,000	106
Group Four				
St. Louis	839,200	100	941,323,000	100
Baltimore	819,000	98	1,011,371,000	108
Boston	793,100	94	1,727,230,000	183
Pittsburgh	665,500	79	1,014,116,000	108
Group Five				
Detroit	1,334,500	100	2,359,934,000	100
Los Angeles	1,300,000	100	1,232,517,000	48
Cleveland	984,500	74	1,491,888,000	58
Group Six				
New York	5,970,800	100	12,991,558,000	100
Chicago	3,102,800	52	2,885,840,000	22
Philadelphia	2,035,900	33	3,055,214,000	24

CHAPTER XXII

THE APPRAISAL OF LAND

Depth and Value.—It has long been an acknowledged fact that the value of property decreases as it recedes from the street, and scientific study of the fact has proved that the decrease in value is not directly proportional to the distance from the street, but that its variation in value may be expressed by a parabolic curve in which the acceleration of decrease in value is less as the depth of the lot increases. Interesting studies by Somers, Jannsen, King, Leenhouts, Lindsey, Bernard, Neill, Hoffman, Davies, Zangerle, Pleydell, Martin, Craigen, Babcock and others have been made, endeavoring to establish the correct relationship between depth and value, and the interesting fact has been established that all of the charts strikingly agree as to the fundamental variation of value relative to depth.

Depth tables depend upon the following factors:

1. Utility of property.
2. Size of standard lot.
3. Population of city.

The decision of Judge Murray Hoffman of New York City in 1866 when he ruled that the front half of a lot 100 ft. deep was worth two-thirds of the value of the entire lot established a precedent for the determination of values relative to depth. The most notable step was made by W. A. Somers about 1909, when he devised a depth curve whereby the percentage of value for each foot increment in depth was established in accordance with investigations which he made of the values of a large number of properties in St. Paul. Since that time other depth charts based upon the principles laid down by Hoffman and Somers have been submitted and largely substantiate the earlier charts.

Utility of Property.—It is impossible to apply a single depth curve to meet every condition, especially where the properties are used for various purposes. As a general rule the more valuable a property becomes the more we find the concentration

of value near the front of the lot. Expressing it otherwise, the front ten feet of a high-class retail or financial district property has a higher percentage of total lot value than the front ten feet of a residence lot. This we will call the "depth concentration factor."

Depth Concentration Factor.—The depth concentration factors for the various classifications of property are listed below, commencing with financial district property where the depth concentration factor is the highest and ending with farm land where the depth concentration factor is the lowest.

1. High-class retail and financial district.
2. Ordinary retail district.
3. Wholesale and warehouse district.
4. Residence district.
5. Apartment district.
6. Factory district.
7. Farm district.

The depth curve for financial district property will be a decided parabola and tend more toward the vertical near the front of the lot, whereas the depth curve for farm property will be a straight line showing equal values regardless of depth.

Size of Standard Lot.—Lots differ in size in various cities of the United States. No fixed rules can be applied to all cities and to endeavor to establish a single depth curve based on 100 ft., or some other depth dimension, which is applicable without reservation to every case is illogical and impracticable.

A depth curve based upon a 100 ft. depth should not be used where the standard is 120, 125 or 150 ft. The standard depths of lots in a number of cities of the United States are as follows; Detroit, Rochester, Philadelphia, Newark, Portland, Pittsburgh, Los Angeles, Cleveland, Chicago, New York and St. Paul 100 ft.; Bridgeport business lots 85 ft. and residence lots 120 ft.; Buffalo and Milwaukee residence lots 120 ft. and business lots 100 ft.; Denver 125 ft.; Baltimore 150 ft.

Before adopting a depth curve in any city a study of existing property dimensions and uses should be made, and a curve accepted or drawn which will most nearly represent the average local values for classified properties and standard depths.

Depth Tables.—In submitting the following depth curves and tables, the authors are aware that they may be subject to some criticism because of their inability to meet some

specific local condition. This criticism must be applied, also, to every other depth curve which has heretofore been submitted. In preparing these tables many other tables and charts with their basic data have been studied, and the best features have been retained in the curves. It is advisable, however, for every assessor to make a complete study which may necessitate the reconstruction of the depth curves to meet local conditions.

TABLE 168.—DEPTH FACTORS. HIGH-CLASS RETAIL AND FINANCIAL DISTRICT

Depth, feet	Standard lot depth			
	100 ft.	120 ft.	125 ft.	150 ft.
5	20.8	17.2	15.5	12.2
10	31.4	27.1	25.5	21.3
15	40.0	35.3	33.2	28.9
20	47.4	42.1	39.8	35.4
25	53.6	47.9	45.6	41.5
30	59.2	53.1	50.8	47.2
35	62.4	58.0	55.5	52.7
40	68.8	62.6	59.8	57.6
45	73.0	66.9	63.8	62.1
50	76.8	70.8	67.5	66.2
55	80.2	74.4	71.0	69.9
60	83.3	77.7	74.3	73.3
65	86.1	80.7	77.4	76.3
70	88.6	83.4	80.3	79.0
75	90.9	85.9	83.0	81.4
80	93.0	88.2	85.5	83.6
85	94.9	90.3	87.8	85.6
90	96.7	92.2	89.9	87.4
95	98.4	93.9	91.8	89.0
100	100.0	95.4	93.5	90.5
105	101.5	96.7	95.0	91.9
110	102.9	97.9	96.4	93.2
115	104.2	99.0	97.7	94.4
120	105.4	100.0	98.9	95.5
125	106.5	100.9	100.0	96.5
130	107.5	101.8	101.0	97.0
135	108.4	102.6	102.0	98.2
140	109.2	103.4	102.9	98.9
145	109.9	104.1	103.7	99.5
150	110.5	104.8	104.4	100.0
155	111.1	105.5	105.0	100.5
160	111.6	106.1	105.5	100.9
165	112.1	106.7	106.0	101.3
170	112.6	107.3	106.4	101.6
175	113.1	107.8	106.8	101.8
180	113.5	108.3	107.1	102.0
185	113.9	108.8	107.4	102.2
190	114.3	109.2	107.6	102.3
195	114.7	109.6	107.8	102.4
200	115.0	110.0	108.0	102.5

TABLE 169.—DEPTH FACTORS. ORDINARY RETAIL DISTRICT

Depth, feet	Standard lot depth			
	100 ft.	120 ft.	125 ft.	150 ft.
5	16.1	12.0	12.1	9.2
10	26.6	21.7	20.6	16.3
15	34.9	29.5	27.8	23.2
20	42.3	36.6	33.9	29.7
25	48.9	43.1	39.4	35.8
30	54.9	49.0	44.5	41.5
35	60.3	54.4	49.3	46.8
40	65.2	59.3	53.8	51.7
45	69.6	63.7	58.1	56.2
50	73.6	67.7	62.2	60.4
55	77.2	71.4	66.1	64.3
60	80.5	74.8	69.8	67.9
65	83.5	78.0	73.3	71.2
70	86.3	81.0	76.6	74.2
75	88.9	83.8	79.7	77.0
80	91.3	86.4	82.6	79.6
85	93.6	88.8	85.3	82.0
90	95.8	91.0	87.8	84.2
95	97.9	93.0	90.1	86.2
100	100.0	94.8	92.2	88.0
105	101.9	96.4	94.1	89.6
110	103.7	97.8	95.8	91.1
115	105.3	99.0	97.3	92.5
120	106.9	100.0	98.7	93.8
125	108.3	100.9	100.0	95.0
130	109.6	101.8	101.2	96.1
135	110.8	102.7	102.3	97.2
140	111.9	103.6	103.3	98.2
145	112.9	104.5	104.2	99.2
150	113.8	105.3	105.0	100.0
155	114.7	106.1	105.8	100.8
160	115.5	106.9	106.5	101.5
165	116.2	107.7	107.2	102.1
170	116.9	108.5	107.8	102.6
175	117.5	109.2	108.4	103.1
180	118.1	109.9	109.0	103.5
185	118.7	110.6	109.5	103.9
190	119.6	111.3	110.0	104.3
195	119.6	112.0	110.5	104.7
200	120.0	112.5	111.0	105.0

TABLE 170.—DEPTH FACTORS. APARTMENT DISTRICT

Depth, feet	Standard lot depth			
	100 ft.	120 ft.	125 ft.	150 ft.
5	6.7	5.4	5.2	5.0
10	12.6	10.5	10.3	9.5
15	18.3	15.5	15.3	13.8
20	23.9	20.4	20.2	17.9
25	29.4	25.2	25.0	21.8
30	34.8	29.9	29.7	25.5
35	40.1	34.5	34.3	29.1
40	45.3	39.0	38.8	32.6
45	50.4	43.4	43.2	36.1
50	55.4	47.7	47.5	39.5
55	60.3	51.9	51.7	42.9
60	65.1	56.0	55.8	46.2
65	69.8	60.0	59.8	49.5
70	74.4	63.9	63.7	52.8
75	78.9	67.7	67.5	56.0
80	83.3	71.4	71.2	59.2
85	87.6	75.1	74.8	62.4
90	91.8	78.7	78.3	65.6
95	95.9	82.3	81.7	68.8
100	100.0	85.9	85.0	71.9
105	104.0	89.5	88.2	75.0
110	108.0	93.0	91.3	78.1
115	112.0	96.5	94.3	81.1
120	115.9	100.0	97.2	84.1
125	119.8	103.5	100.0	87.0
130	123.7	107.0	102.8	89.8
135	127.5	110.5	105.6	92.5
140	131.3	114.0	108.4	95.1
145	135.1	117.5	111.2	97.6
150	138.8	121.0	114.0	100.0
155	142.5	124.4	116.8	102.4
160	146.2	127.8	119.6	104.8
165	149.8	131.2	122.4	107.2
170	153.4	134.6	125.2	109.7
175	157.0	138.0	128.0	112.2
180	160.6	141.4	130.8	114.7
185	164.2	144.8	133.8	117.2
190	167.8	148.2	136.4	119.8
195	171.4	151.6	139.2	122.4
200	175.0	155.0	142.0	125.0

TABLE 171.—DEPTH FACTORS. WHOLESALE AND WAREHOUSE DISTRICT

Depth, feet	Standard lot depth			
	100 ft.	120 ft.	125 ft.	150 ft.
5	10.5	8.0	7.7	6.8
10	18.4	15.2	14.3	12.0
15	25.7	22.0	20.2	17.1
20	32.6	28.4	25.9	22.1
25	39.1	34.4	31.4	27.0
30	45.2	40.0	36.7	31.8
35	50.9	45.3	41.8	36.4
40	56.2	50.3	46.7	40.8
45	61.2	55.0	51.4	45.0
50	65.9	59.4	55.9	49.0
55	70.3	63.6	60.2	52.8
60	74.4	67.6	64.3	56.4
65	78.3	71.4	68.2	59.8
70	82.0	75.0	71.9	63.0
75	85.5	78.4	75.4	66.1
80	88.8	81.6	78.7	69.1
85	91.9	84.6	81.8	72.0
90	94.8	87.4	84.7	74.8
95	97.5	90.0	87.4	77.5
100	100.0	92.4	89.9	80.1
105	102.4	94.6	92.2	82.6
110	104.7	96.6	94.3	85.0
115	106.9	98.4	96.3	87.3
120	109.0	100.0	98.2	89.5
125	111.0	101.5	100.0	91.6
130	112.9	102.9	101.7	93.6
135	114.7	104.2	103.3	95.5
140	116.4	105.5	104.8	97.2
145	118.0	106.7	106.2	98.7
150	119.5	107.9	107.5	100.0
155	112.9	109.0	108.7	101.2
160	122.2	110.0	109.8	102.3
165	123.4	111.1	110.8	103.3
170	124.5	112.1	111.7	104.2
175	125.5	113.0	112.5	105.0
180	126.5	113.9	113.2	105.7
185	127.4	114.7	113.8	106.3
190	128.3	115.5	114.3	106.8
195	129.2	116.3	114.7	107.2
200	130.0	117.0	115.0	107.5

TABLE 172.—DEPTH FACTORS. FACTORY DISTRICT

Depth, feet	Standard lot depth			
	100 ft.	120 ft.	125 ft.	150 ft.
5	5.9	4.7	4.7	4.5
10	11.6	9.3	9.1	8.5
15	17.1	13.8	13.5	12.4
20	22.5	18.2	17.8	16.2
25	27.8	22.6	22.1	19.9
30	33.0	27.0	26.4	23.5
35	38.1	31.3	30.6	27.0
40	43.1	35.6	34.8	30.5
45	48.1	39.9	39.0	33.9
50	53.0	44.1	43.1	37.3
55	57.9	48.3	47.2	40.7
60	62.7	52.2	51.3	44.0
65	67.5	56.6	55.3	47.3
70	72.2	60.7	59.3	50.6
75	76.9	64.8	63.3	53.9
80	81.6	68.8	67.2	57.2
85	86.2	72.8	71.1	60.5
90	90.8	76.8	75.0	63.8
95	95.4	80.7	78.8	67.0
100	100.0	84.6	82.6	70.2
105	104.5	88.5	86.3	73.4
110	109.0	92.4	89.9	76.5
115	113.5	96.2	93.4	79.6
120	118.0	100.0	96.8	82.7
125	122.5	103.8	100.0	85.7
130	127.0	107.6	103.3	88.7
135	131.5	111.4	106.7	91.6
140	136.0	115.2	110.0	94.5
145	140.5	119.0	113.3	97.3
150	145.0	122.8	116.7	100.0
155	149.5	126.6	120.0	102.8
160	154.0	130.4	123.3	105.6
165	158.5	134.2	126.7	108.4
170	163.0	137.9	130.0	111.2
175	167.5	141.6	133.3	114.0
180	172.0	145.3	136.7	116.9
185	176.5	149.0	140.0	119.8
190	181.0	152.7	143.3	122.7
195	185.5	156.4	146.7	125.6
200	190.0	160.0	150.0	128.5

TABLE 173.—DEPTH FACTORS. RESIDENCE DISTRICT

Depth, feet	Standard lot depth			
	100 ft.	120 ft.	125 ft.	150 ft.
5	8.0	6.5	6.2	5.8
10	15.1	12.9	11.7	10.5
15	21.7	19.3	17.1	15.1
20	28.0	25.3	22.4	19.6
25	34.0	31.0	27.5	24.0
30	39.8	36.4	32.5	28.3
35	45.4	41.6	37.3	32.5
40	50.8	46.6	41.9	36.6
45	56.0	51.4	46.4	40.6
50	61.0	56.0	50.8	44.5
55	65.8	60.4	55.1	48.3
60	70.4	64.6	59.3	52.0
65	74.8	68.6	63.4	55.6
70	79.0	72.4	67.4	59.1
75	83.0	76.0	71.3	62.5
80	86.8	79.4	75.0	65.8
85	90.4	82.6	78.5	69.0
90	93.8	85.6	81.9	72.1
95	97.0	88.4	85.1	75.1
100	100.0	91.0	88.1	78.0
105	103.0	93.4	90.9	80.8
110	105.9	95.7	93.5	83.5
115	108.8	97.9	95.9	86.1
120	111.6	100.0	98.1	88.6
125	114.3	102.0	100.0	91.0
130	117.0	103.9	101.9	93.2
135	119.7	105.7	103.7	95.2
140	122.3	107.4	105.4	97.0
145	124.9	109.0	107.0	98.6
150	127.4	110.5	108.5	100.0
155	129.9	111.9	109.9	101.3
160	132.3	113.2	111.2	102.6
165	134.7	114.4	112.4	103.8
170	137.0	115.5	113.5	104.9
175	139.3	116.5	114.5	106.0
180	141.5	117.4	115.4	107.0
185	143.7	118.2	116.2	107.9
190	145.8	118.9	116.9	108.7
195	147.9	119.5	117.5	109.4
200	150.0	120.0	118.0	110.0

TABLE 174.—DEPTH FACTORS. FARM DISTRICT

Depth, feet	Standard lot depth			
	100 ft.	120 ft.	125 ft.	150 ft.
5	5.00	4.15	4.00	3.33
10	10.00	8.33	8.00	6.66
15	15.00	12.50	12.00	10.00
20	20.00	16.67	16.00	13.33
25	25.00	20.83	20.00	16.67
30	30.00	25.00	24.00	20.00
35	35.00	29.16	28.00	23.33
40	40.00	33.33	32.00	26.67
45	45.00	37.50	36.00	30.00
50	50.00	41.67	40.00	33.33
55	55.00	45.83	44.00	36.67
60	60.00	50.00	48.00	40.00
65	65.00	54.17	52.00	43.33
70	70.00	58.33	56.00	46.67
75	75.00	62.50	60.00	50.00
80	80.00	66.67	64.00	53.33
85	85.00	70.83	68.00	56.67
90	90.00	75.00	72.00	60.00
95	95.00	79.16	76.00	63.33
100	100.00	83.33	80.00	66.67
105	105.00	87.50	84.00	70.00
110	110.00	91.67	88.00	73.33
115	115.00	95.83	92.00	76.67
120	120.00	100.00	96.00	80.00
125	125.00	104.16	100.00	83.33
130	130.00	108.33	104.00	86.67
135	135.00	112.50	108.00	90.00
140	140.00	116.67	112.00	93.33
145	145.00	120.83	116.00	96.67
150	150.00	125.00	120.00	100.00
155	155.00	129.16	124.00	103.37
160	160.00	133.33	128.00	106.67
165	165.00	137.50	132.00	110.00
170	170.00	141.67	136.00	113.33
175	175.00	145.83	140.00	116.67
180	180.00	150.00	144.00	120.00
185	185.00	154.16	148.00	123.33
190	190.00	158.33	152.00	126.67
195	195.00	162.50	156.00	130.00
200	200.00	166.67	160.00	133.33

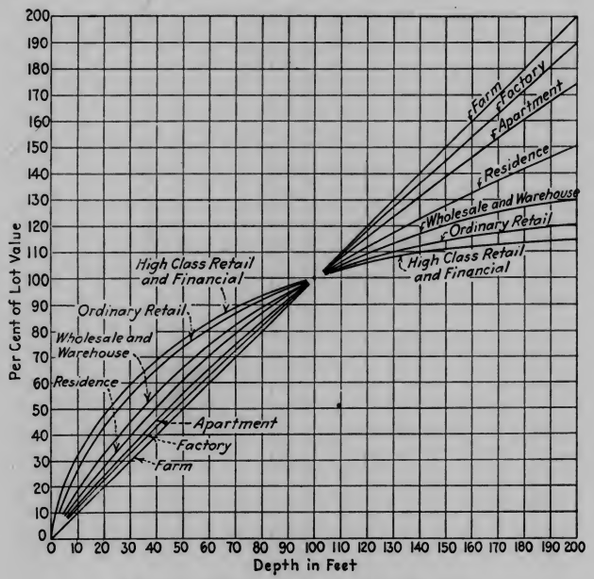


FIG. 94.—Hundred-feet standard depth chart.

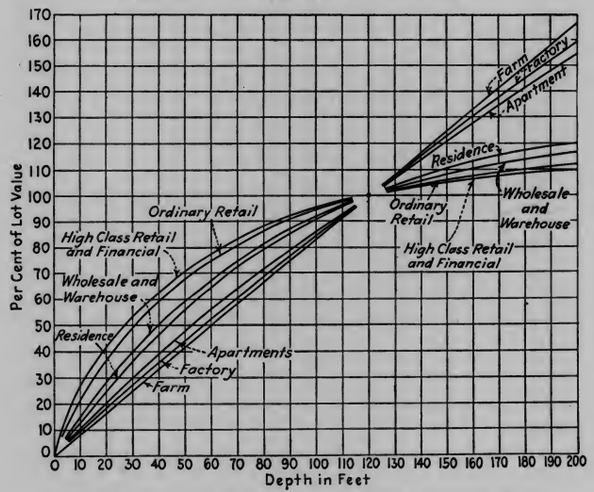


FIG. 95.—One hundred and twenty-feet standard depth chart.

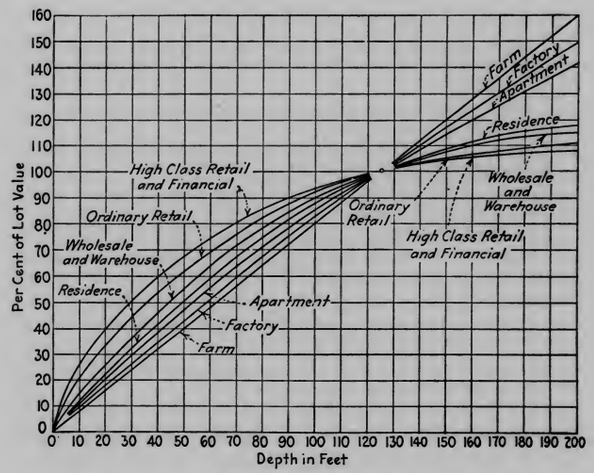


FIG. 96.—One hundred and twenty-five-feet standard depth chart.

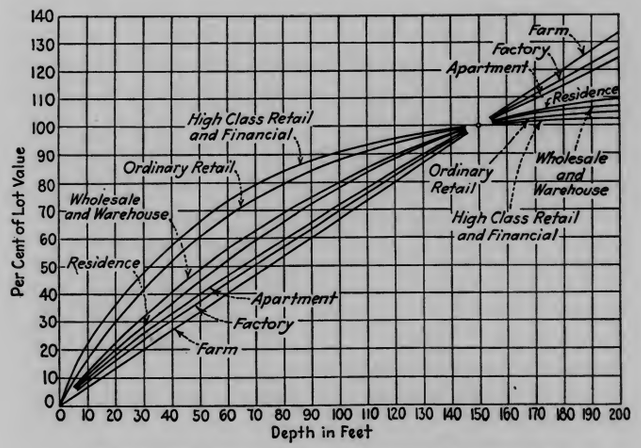


FIG. 97.—One hundred and fifty-feet standard depth chart.

Inside Rectangular Lots.

Rule 1.—The value of a standard depth inside rectangular lot is determined by multiplying the number of feet frontage of the lot upon the street by the *base value.*

Rule 2.—The value of an inside rectangular lot which is not of standard depth is determined by multiplying the number of feet frontage of the lot upon the street by the *base value* and then by the *depth factor* found in Tables 168 to 174 inclusive.

Explanation.—These rules apply only to inside rectangular lots which are 100 ft. or more from the corner of an intersecting street. They do not take into consideration "corner" or "alley" influence which will be considered later. In speaking of a standard lot, we refer to a lot having both standard width and standard depth. Rules 1 and 2 are concerned primarily with the effect of the depths of lots upon value, because the effect of the width of lots upon the value is a mathematical constant directly proportional to the width. In the following examples, V equals the lot value.

Example 1.—What is the value of lot 5 (Fig. 98) considering the standard lot depth to be 125 ft. and the base value $200?

$$V = 25 \text{ (ft.)} \times \$200 = \$5{,}000.$$

Example 2.—What is the value of lot 5 (Fig. 98) considering the standard lot depth to be 100 ft. and the base value $200? The lot is located in a high-class retail district.

$$V = 25 \text{ (ft.)} \times \$200 \times 106.5\% \text{ (Table 168)} = \$5{,}325.$$

Example 3.—What is the value of lot 5 (Fig. 98) considering the standard lot depth to be 150 ft. and the base value $200? The lot is located in a residence district.

$$V = 25 \text{ (ft.)} \times \$200 \times 91.0\% \text{ (Table 173)} = \$4{,}550.$$

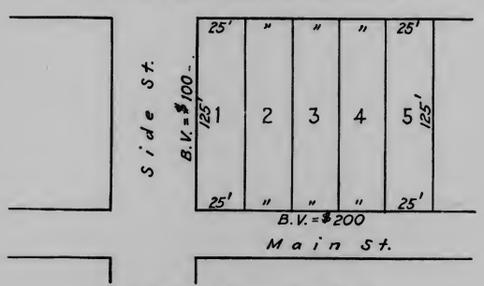


FIG. 98.—Inside rectangular lots.

Rectangular Lots; Two-street Frontage.

Rule.—The value of a rectangular lot fronting on two streets which are parallel is determined by dividing the lot into two parcels by a *merge line* and figuring the value of each parcel separately, using depths as determined by the merge line.

Explanation.—Referring to the definition of merge line we find that it is an imaginary line located between two parallel streets indicating points of equal value calculated from both streets. The merge line is always parallel with the two streets.

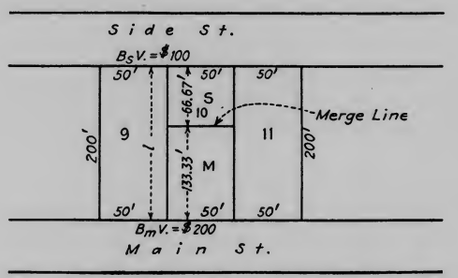


FIG. 99.—Rectangular lot, two-street frontage.

Formula: See Fig. 99.

Let.

M = parcel of land fronting on main street.
S = parcel of land fronting on side street.
BmV = main street base value.
BsV = side street base value.
Vm = value of parcel M.
Vs = value of parcel S.
l = total depth of lot.
m = depth of parcel M.
s = depth of parcel S.
V = total value.

then

$$l = m + s$$

and

$$m = \frac{BsV \times l}{BsV + BmV} \qquad s = \frac{BmV \times l}{BsV + BmV}$$

Example 1.—What is the value of lot 10 (Fig. 99) considering the standard lot depth to be 100 ft. with a base value of $200 on main street and a base value of $100 on side street? The lot is located in an ordinary retail district.

To determine the location of the *merge line* we have:

$$s = \frac{100(\$) \times 200 \text{ (ft.)}}{100(\$) + 200(\$)} = \frac{20{,}000}{300} = 66.67 \text{ (ft.)}$$

$$m = \frac{200(\$) \times 200 \text{ (ft.)}}{100(\$) + 200(\$)} = \frac{40{,}000}{300} = 133.33 \text{ (ft.)}$$

For parcel M we have:

$$Vm = 50 \text{ (ft.)} \times \$200(BmV) \times 110.0\% \text{ (Table 169)} = \$11,000$$

For parcel S we have:

$$Vs = 50 \text{ (ft.)} \times \$100(BsV) \times 84.4\% \text{ (Table 169)} = \$4,220,$$

and

$$V = Vm + Vs = \$15,220.$$

Example 2.—What is the value of lot 10 (Fig. 99) considering the standard lot to be 125 ft. in depth with a base value of $50 on main street and a base value of $25 on side street? The lot is located in a residence district.

We find that

$$m = 66.67 \text{ (ft.) and } s = 133.33 \text{ (ft.)}$$

Then, for parcel M we have

$$Vm = 50 \text{ (ft.)} \times \$50 \times 64.7\% \text{ (Table 173)} = \$1,618,$$

and, for parcel S we have

$$Vs = 50 \text{ (ft.)} \times \$25 \times 103.1\% \text{ (Table 173)} = \$1,289,$$

and

$$V = \$1,618 + \$1,289 = \$2,907.$$

Corner Influence.—The increment of value added to lots on and adjacent to a corner, due to the proximity of an intersecting street, is known as "corner influence" and is recognized by all authorities on the valuation of land. Many rules for calculating this increment of value have been submitted, all of which differ in detail with varied results. In the valuation of urban land the greatest divergence of opinion among experts lies in the methods used in computing corner influence. To lay down fixed rules in this manual for the universal solution of the problem would be impracticable, and the authors are therefore placing before the readers a resumé of the best thought and practice governing the subject at the present time, together with rules and tables from which the appraiser may make a selection applicable to his own local needs.

Corner lots in a business district have the following advantages over interior lots:

1. More air and sunshine.
2. More window display space and goods shown to better advantage.
3. Easily accessible to pedestrians, automobile and street-car traffic.
4. Affords more desirable area for plottage upon which large buildings may be erected.
5. Better fire protection and quicker egress in case of fire.
6. In view of pedestrian traffic from four directions.

Property Affected by Corner Influence.—The effect of corner influence varies with the type of property under consideration, and the relative degree in which various types of property are affected is shown in the following classification:

1. High-class retail and financial.
2. Ordinary retail.
3. Hotels and apartments.
4. Wholesale and warehouses.
5. Factory.
6. Residence.
7. Farm.

Corner influence generally has considerable effect upon the value of high-class retail and financial district property, whereas its effect upon farm property is negligible.

Principles governing corner influence may be stated as follows:

1. The more valuable a corner property becomes the more will its value be affected by corner influence.
2. The higher the percentage of side street to main street base values the greater the increment of side street influence upon the corner property.
3. The value of a corner lot can never be greater than the combined values of the two lots, one being figured from each frontage.
4. In computing the corner influence for any specific property, the increment of value is the same along any line drawn parallel with the street contributing the increment of value.
5. The corner increment of value is greatest for the foot depth fronting on the street contributing the increment of value, and it does not decrease uniformly receding from said street to the point of zero corner influence, which may be anywhere from 25 to 100 ft. from the side street.
6. The overlap and reflected values are not to be considered for areas which have received an increment of value due to corner influence.
7. Corner lots cannot be valued by adding the full values obtained by considering them as rectangular lots fronting on each street. Values thus obtained are excessively high.

Methods for Calculating Corner Influence.—Cities differ considerably on the width of main street frontage measuring from the corner, which is subject to corner influence. Baltimore, Ft. Worth, Minneapolis, Springfield, St. Louis, Houston, Denver, Cleveland, St. Paul (business), Chicago, Rochester and Cambridge use 100 ft.; Detroit 60 ft.; Bridgeport and St. Paul (wholesale) 50 ft.; Jacksonville 52½ ft.; Milwaukee 40 ft.; Buffalo 30 ft.; New York City, Jersey City and Newark 25 ft.; Omaha, corner lot 73 per cent, second lot 18 per cent and third lot 9 per cent.

Before adopting a definite rule governing the distance from the corner over which corner influence is a factor, the appraiser should make a thorough study of the existing conditions in each city where the rule is to be applied, and then adopt a method for figuring which will give satisfactory results. In this treatise the zone of corner influence is considered to extend 100 ft. from the corner. A number of systems heretofore proposed are so technical and complicated in character as to render them impractical for general use. Simpler systems more easily applied and give results which are equally satisfactory. Several cities add a flat percentage of the side street value to the main street value for the corner lot. This practice is not based on either fact or scientific principle. Other cities consider the increment of corner influence for every corner location to be the same regardless of the size of the corner lot. This practice results in unequal and unfair valuations. Any scientific system for appraising corner influence value must consider the following factors:

1. The area affected by the corner influence.
2. The ratio of base values between main street and side street.
3. The value relationship between the zone of corner influence and the adjacent interior lot.
4. The utility of the property.
5. The amount of the main street base value.

The most practical methods for figuring corner influence have been submitted by W. A. Somers, John Zangerle and the city of Rochester. These methods are based upon the principle that for main street lots the amount of corner influence value is found by multiplying the 100 ft. frontage on the main street, which is subject to corner influence, by a certain percentage of the side street base value, depending upon the frontage of the lot on main street. This percentage is given in what is known as the Somers, Zangerle and Rochester curves.

Each of the curves, however, seems to be objectionable to a certain extent. The Somers curve places a too high value on property 50 to 100 ft. from the corner and will give a high differential between the two properties adjacent to the line 100 ft. from the corner. The Zangerle curve is very irregular and the Rochester curve is too flat. The authors' curve seems to eliminate these objections by striking a fair average of the other curves. Table 175 gives the figures from which the curve is constructed.

TABLE 175.—CORNER INFLUENCE. BUSINESS CORNERS, BASE VALUE $200 OR MORE

A	*B*	*A*	*B*	*A*	*B*	*A*	*B*	*A*	*B*
1	3.5	21	37.7	41	56.4	61	68.4	81	75.9
2	6.0	22	38.9	42	57.1	62	68.9	82	76.2
3	8.4	23	40.0	43	57.8	63	69.4	83	76.5
4	10.9	24	41.1	44	58.5	64	69.8	84	76.8
5	13.0	25	42.1	45	59.2	65	70.2	85	77.0
6	15.2	26	43.1	46	59.9	66	70.6	86	77.3
7	17.3	27	44.1	47	60.6	67	71.0	87	77.6
8	19.3	28	45.1	48	61.2	68	71.4	88	77.8
9	21.2	29	46.1	49	61.8	69	71.8	89	78.0
10	22.9	30	47.1	50	62.4	70	72.2	90	78.2
11	24.5	31	48.0	51	63.0	71	72.6	91	78.4
12	26.0	32	48.9	52	63.6	72	73.0	92	78.6
13	27.5	33	49.8	53	64.2	73	73.4	93	78.8
14	28.9	34	50.7	54	64.8	74	73.7	94	79.0
15	30.2	35	51.6	55	65.3	75	74.0	95	79.2
16	31.5	36	52.4	56	65.9	76	74.4	96	79.4
17	32.8	37	53.2	57	66.4	77	74.7	97	79.6
18	34.1	38	54.0	58	66.9	78	75.0	98	79.8
19	35.3	39	54.8	59	67.4	79	75.3	99	79.9
20	36.5	40	55.6	60	67.9	80	75.6	100	80.0

A = distance from corner in feet, fronting on main or high-value street.
B = percentage of side street value to be added to main street value for corner influence.

Business Corner Lots Fronting on Main Street, Base Value $200 or More.
Rule.—For business corner lots fronting on main street having a base value of $200 or more, the increment of corner influence value is determined by multiplying the side street base value by 100 and then by the percentage *B* for a given frontage *A*, as shown in Table 175.
Explanation.—In the following examples these abbreviations will be used:

V = value of lot or lots.
PV = primary value or value figured as an inside rectangular lot.
CIV = corner influence value.
AIV = alley influence value.
BV = base value.
CI = corner influence.
AI = alley influence.
Side St. = street having the lowest base value.
Main St. = street having the highest base value.

Example 1.—What is the value of lots 1, 2, 3, 4 (Fig. 100) which are located in a high-class business district?

For the primary value, we have
PV = 100 (ft. frontage on Main St.) × \$600 (Main St. BV) = \$60,000, and, for the corner influence, we have
CIV = 100 (ft. frontage on Side St.) × \$200 (Side St. BV) × 80% (100 ft. frontage on Main St., Table 175) = \$16,000.

$$V = \$60{,}000 + \$16{,}000 = \$76{,}000.$$

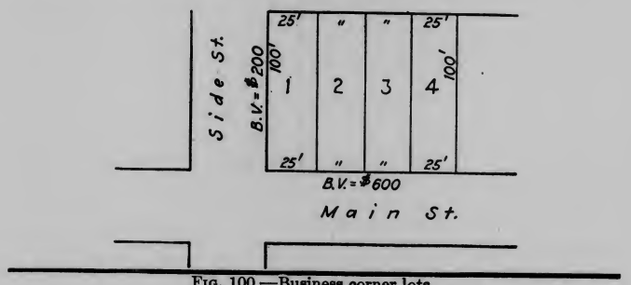


FIG. 100.—Business corner lots.

Example. 2.—What is the value of lot 3 (Fig. 100)?
We have
PV = 25 (ft. frontage on Main St.) × \$600 (Main St. BV) = \$15,000, and, for corner influence, we have
CIV = 100 (ft. frontage on Side St.) × \$200 (Side St. BV) × 11.6% (74% for 75 ft. frontage − 62.4% for 50 ft. frontage on Main St., Table 175) = \$2,320.

$$V = \$15{,}000 + \$2{,}320 = \$17{,}320.$$

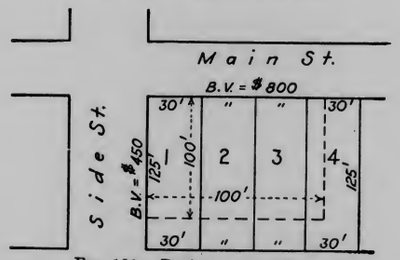


FIG. 101.—Business corner lots.

Example 3.—What is the value of lot 2 (Fig. 101) which is located in a high-class retail business district where the standard lot has a depth of 125 ft.?
PV = 30 (ft. frontage on Main St.) × \$800 (Main St. BV) = \$24,000.
CIV = 100 (ft. frontage on Side St.) × \$450 (Side St. BV) × 20.8%

(67.9% for 60 ft. frontage − 47.1% for 30 ft. frontage on Main St.) = \$9,360.

$$V = \$24{,}000 + \$9{,}360 = \$33{,}360.$$

Splits.—See definition page 296.

Rule.—Where the corner lots are split to front on main street they will be figured in the same way that any full lot would be figured.

Example 1.—What is the value of the west ½ of lot 4 (Fig. 101)?
PV = 15 (ft. frontage on Main St.) × \$800 (Main St. BV) = \$12,000.
CIV = 100 (ft. frontage on Side St.) × \$450 (Side St. BV) × 1.8% (80% for 100 ft. frontage − 78.2% for 90 ft. frontage on Main St., Table 175) = \$810.

$$V = \$12{,}000 + \$810 = \$12{,}810.$$

Cuts.—See definition page 293.

Rule.—Where the corner lots are cut to front on the side street they will be regarded as lots running parallel with the main street and figured according to the rules following for corner lots fronting on the side street, value \$200 or more.

Business Corner Lots Fronting on Side Street, Base Value \$200 or More on Main Street.

Rule.—For business corner lots fronting on side street and having a base value of \$200 or more on main street, the 100 ft. frontage on side street subject to corner influence from main street is to be considered as fronting on main street, and the total value thereof calculated according to the rules and tables on page 321. The value of any part can then be calculated by means of Table 176.

Explanation.—The above rule applies only when the 100-ft. frontage on side street is in the same ownership. In a number of cities business district lots are laid out parallel with the main or high-value street. This condition exists in Denver where the calculation of values according to Table 176 has proved to be satisfactory. The ratio of the fifth lot and fourth lot values is given to help prevent any serious discrepancy between the values of these two lots, which often occurs when other rules used in common practice are applied. Where the four corner lots are not in the same ownership, plottage becomes a factor (see page 295).

TABLE 176.—BUSINESS CORNER LOTS PARALLEL WITH MAIN STREET, BASE VALUE $200 OR MORE ON MAIN STREET
Percentage of Total Corner Influence to Be Added

Ratio of *BV* main st. to side st.	Approx. ratio 4th to 5th lot Value	Frontage on side street measured from main street, feet																				
		0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
1:1	1:1	0	8.4	16.7	24.5	32.0	39.1	45.8	52.2	58.1	63.7	68.9	73.7	78.2	82.2	85.9	89.2	92.1	94.7	96.8	98.6	100.0
1½:1	1:18	0	8.6	16.9	24.9	32.4	39.6	46.3	52.7	58.7	64.3	69.5	74.2	78.7	82.7	86.4	89.6	92.5	94.9	97.0	98.7	100.0
2:1	1:25	0	8.8	17.2	25.2	32.8	40.0	46.8	53.2	59.2	64.8	70.0	74.8	79.2	83.2	86.8	90.0	92.8	95.2	97.2	98.8	100.0
3:1	1:45	0	10.7	19.0	26.9	34.4	41.5	48.2	54.5	60.4	65.9	71.0	75.7	80.0	83.9	87.4	90.5	93.2	95.6	97.4	98.9	100.0
4:1	1:58	0	10.9	19.3	27.2	34.8	42.0	48.7	55.0	60.9	66.5	71.6	76.2	80.5	84.4	87.9	90.9	93.5	95.7	97.6	99.0	100.0
5:1	1:68	0	11.3	19.8	27.9	35.6	42.9	49.7	56.1	62.0	67.4	72.7	77.3	81.6	85.4	88.8	91.7	94.2	96.3	98.0	99.2	100.0
6:1	1:76	0	11.7	20.4	28.6	36.4	43.8	50.7	57.1	63.1	68.7	73.8	78.4	82.6	86.4	89.7	92.5	94.9	96.9	98.4	99.4	100.0
7:1	1:83	0	12.0	20.9	29.3	37.2	44.7	51.6	58.1	64.2	69.8	74.9	79.5	83.6	87.3	90.6	93.3	95.6	97.4	98.7	99.6	100.0
8:1	1:90	0	12.2	21.2	29.6	37.6	45.1	52.1	58.7	64.7	70.3	75.4	80.0	84.2	87.8	91.0	93.7	95.9	97.7	98.9	99.7	100.0
9:1	1:95	0	12.4	21.4	30.0	38.0	45.6	52.6	59.2	65.3	70.9	76.0	80.6	84.7	88.3	91.5	94.1	96.3	97.9	99.1	99.8	100.0
10:1	2:00	0	12.6	21.7	30.3	38.4	46.0	53.1	59.7	65.8	71.4	76.5	81.1	85.2	88.8	91.9	94.5	96.6	98.2	99.3	99.9	100.0

NOTE.—For lots having a base value from $50 to $200 on main street, use percentages given for 2:1 ratio in this table.

Example 1.—What is the value of lots 3 and 4 (Fig. 102) where the first four lots are in one ownership and located in a high-class retail business district? The standard lot depth is 100 ft.

FIG. 102.—Business corner lots fronting on side street

Consider the four lots as fronting on main street. Then, for lots 3 and 4, we have

PV = 100 (ft. frontage on Main St.) × $1,200 (Main St. BV) × 23.2% (for depth of 50 ft. to 100 ft., Table 168) = $27,840.

For lots 1 to 4 inclusive, the corner influence value is CIV = 100 (ft. frontage on Side St.) × $600 (Side St. BV) × 80% (for 100 ft. frontage on Main St., Table 175) = $48,000.

FIG. 103.—Business lots fronting on side street.

Referring to Table 176 for ratio of 2:1, we find that lots 1 and 2 receive 70 per cent of the corner influence value. Therefore, lots 3 and 4 receive 30 per cent of the corner influence value, and we have

$$CIV = 30\% \times \$48{,}000 = \$14{,}400,$$

and, for lots 3 and 4, we have

$$V = \$27,840 + \$14,400 = \$42,240.$$

Example 2.—What is the value of parcel A (Fig. 103) which is a cut from lots 1 to 4 inclusive? This property is located in a high-class retail business district where the standard lot depth is 100 ft. We have

PV = 100 (ft. frontage on Main St.) × \$900 (Main St. BV) × 14.1% (90.9% for 75 ft. − 76.8% for 50 ft., Table 168) = \$12,690.

The total corner influence value for lots 1 to 4, inclusive, is

CIV = 100 (ft. frontage on Side St.) × \$300 (Side St. BV) × 80% (Table 175) = \$24,000.

For parcel A we have

CIV. = \$24,000 (total CIV) × 19.5% (90.5% for 75 ft. − 71% for 50 ft., ratio 3:1, Table 176) = \$4,680.

For value of parcel A, we have

$$V = \$12,690 + \$4,680 = \$17,370.$$

Business Corner Lots Fronting on Main St., Base Value \$50 to \$200.

Rule.—For business corner lots fronting on Main St. having a base value from \$50 to \$200, the increment of corner influence value is determined by multiplying the side street base value by 100, and then by the factor given in Table 177.

TABLE 177.—CORNER INFLUENCE. BUSINESS CORNERS. BASE VALUE \$50 TO \$200

Percentage of Side Street Value to Be Added

Main st. base value	Frontage on main street, feet																				
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	
$ 50 to $ 59	3.3	5.7	7.6	9.1	10.5	11.8	12.9	13.9	14.8	15.6	16.3	17.0	17.6	18.1	18.5	18.9	19.3	19.6	19.8	20.0	
60 to 69	3.9	6.8	9.1	10.9	12.6	14.2	15.5	16.7	17.8	18.7	19.6	20.4	21.1	21.7	22.2	22.7	23.1	23.5	23.8	24.0	
70 to 79	4.6	8.0	10.6	12.8	14.7	16.5	18.1	19.5	20.7	21.8	22.8	23.8	24.6	25.3	25.9	26.5	27.0	27.4	27.7	28.0	
80 to 89	5.2	9.1	12.1	14.6	16.8	18.9	20.6	22.2	23.7	25.0	26.1	27.2	28.1	28.9	29.6	30.2	30.8	31.3	31.7	32.0	
90 to 99	5.9	10.3	13.6	16.4	18.9	21.2	23.2	25.0	26.6	28.1	29.4	30.6	31.6	32.5	33.3	34.0	34.7	35.2	35.6	36.0	
100 to 109	6.5	11.4	15.1	18.2	21.0	23.6	25.8	27.8	29.6	31.2	32.6	34.0	35.1	36.1	37.0	37.8	38.5	39.1	39.6	40.0	
110 to 119	7.2	12.6	16.6	20.1	23.1	25.9	28.4	30.6	32.6	34.3	35.9	37.4	38.6	39.7	40.7	41.6	42.4	43.0	43.6	44.0	
120 to 129	7.8	13.7	18.1	21.9	25.2	28.3	31.0	33.4	35.5	37.4	39.2	40.8	42.1	43.3	44.4	45.4	46.2	46.9	47.5	48.0	
130 to 139	8.5	14.9	19.6	23.7	27.4	30.6	33.5	36.1	38.5	40.6	42.4	44.1	45.7	47.0	48.1	49.1	50.1	50.9	51.5	52.0	
140 to 149	9.1	16.0	21.2	25.5	29.5	33.0	36.1	38.9	41.4	43.7	45.7	47.5	49.2	50.6	51.8	52.9	53.9	54.8	55.4	56.0	
150 to 159	9.8	17.2	22.7	27.4	31.6	35.3	38.7	41.7	44.4	46.8	49.0	50.9	52.7	54.2	55.5	56.7	57.8	58.7	59.4	60.0	
160 to 169	10.4	18.3	24.2	29.2	33.7	37.7	41.3	44.5	47.4	49.9	52.2	54.3	56.2	57.8	59.2	60.5	61.6	62.6	63.4	64.0	
170 to 179	11.1	19.5	25.7	31.0	35.8	40.0	43.9	47.3	50.3	53.0	55.5	57.7	59.7	61.4	62.9	64.3	65.5	66.5	67.3	68.0	
180 to 189	11.7	20.6	27.2	32.9	37.9	42.4	46.4	50.0	53.3	56.2	58.8	61.1	63.2	65.0	66.6	68.0	69.3	70.4	71.3	72.0	
190 to 199	12.4	21.7	28.7	34.7	40.0	44.7	49.0	52.8	56.2	59.3	62.0	64.5	66.7	68.6	70.3	71.8	73.2	74.3	75.2	76.0	
200 and up	13.0	22.9	30.2	36.5	42.1	47.1	51.6	55.6	59.2	62.4	65.3	67.9	70.2	72.2	74.0	75.6	77.0	78.2	79.2	80.0	

Example 1.—What is the value of lot 2 (Fig. 104) which is located in an ordinary retail business district where the standard lot depth is 120 ft.? We have

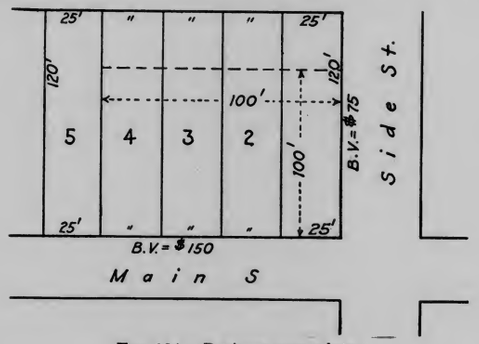


Fig. 104.—Business corner lots.

PV = 25 (ft. frontage on Main St.) × \$150 (Main St. BV) = \$3,750,
and
CIV = 100 (ft. frontage on Side St.) × \$75 (Side St. BV) × 15.2% (46.8% for 50 ft. frontage on Main St. − 31.6% for 25 ft. frontage on Main St.) = \$1,140.

$$V = \$3,750 + \$1,140 = \$4,890.$$

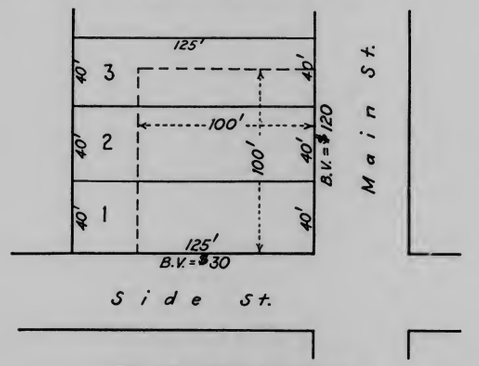


Fig. 105.—Business corner lots

Example 2.—What is the value of lot 3 (Fig. 105) which is in an ordinary retail business district where the standard lot depth is 100 ft.? We have, PV = 40 (ft. frontage on Main St.) × \$120 (Main St. BV) × 108.3% (for depth of 125 ft., Table 169) = \$5,198,

and
CIV = 100 (ft. frontage on Side St.) × \$30 (Side St. BV) × 2.6% (48% for 100 ft. frontage − 45.4% for 80 ft. frontage, Table 177) = \$78.
Then, for lot 3, we have

$$V = \$5,198 + \$78 = \$5,276.$$

Residence Corner Lots.—The practice for establishing values for residence corner lots varies in the cities where rules have been established. In St. Paul 10 per cent is added to the primary value for corners fully improved with sewers, curbing, surfacing, walks, water, etc. No addition is made for unimproved corner residence property.

Rochester does not consider corner influence for residence properties. Milwaukee adds 7½ ft. to the frontage of the lot for the full depth of the lot where the property is fully improved. No additional value is placed upon unimproved corner residence property.

Bridgeport, Ft. Worth, Cleveland, Minneapolis, Springfield, St. Louis and Houston do not consider corner influence in residence districts. Denver adds 50 per cent to the corner 25 ft. for residence property where both streets are fully improved. No addition is made where both streets are not fully improved. Where lots at the end of a block are cut, the corner plot is figured as fronting on the high-value street, and the remainder is figured as fronting on the street adjacent thereto. For corner lots lying parallel with the high-value street, the lots are considered to front on the high-value street and the value is calculated in the regular manner.

In Buffalo 20 per cent is added for all corner lots for a frontage of 30 ft. from the corner. In Detroit 10 per cent is added for all corner lots for a frontage of 30 ft. from the corner. Newark adds 25 per cent for residence corner values.

Alley Influence.—Various rules for establishing added values due to alleys have been used by cities, among which are the following:

1. Cleveland adds one-half the width of the alley to the depth of the lot for either longitudinal or lateral alleys in business districts. No additions are made in residence districts.
2. Milwaukee does not add alley influence for unimproved property. For improved property in residence districts 3 ft. is added to the depth of the lot and for retail, wholesale and industrial property 5 ft. is added to the depth of the lot where alleys exist.

3. Jersey City and Rochester add two-thirds the width of the alley to the depth of the lot.

4. Buffalo adds 10 per cent to the value of the lot for alley influence.

5. Denver's base values include alley influence and where no alley exists for lots 100 ft. and over in depth, 10 ft. is deducted from the depth of the lot. Where the lot depth is less than 100 ft., 10 per cent of the lot depth is deducted. This applies only to business districts, no alley influence allowance being made for residence lots. For business lots having a base value of $200 or more on main street, the 25 ft. frontage on main street adjoining the alley and parallel thereto has a value equal to the third 25 ft. from the side street (standard lot depth equals 125 ft.).

For business lots having a base value from $50 to $200 on main street, the 25 ft. frontage on main street adjoining the alley and parallel thereto is given a 10 per cent added value for alley influence.

Business district alleys add value to the property for the following reasons:

1. Access to the rear or side of a building for loading and unloading purposes.

2. Affords light and air to adjacent buildings.

3. Affords better fire protection.

4. Provides necessary access for the construction of water, sewer, telephone, electric light and power lines.

5. Provides additional display spaces for corner stores.

It is reasonable to assume that the value which alleys add to abutting lots is uniformly distributed to each. In establishing base values, therefore, where the standard lot has an alley adjoining, the alley influence should be included in the base value. If, however, the standard lot does not have an alley adjoining, then alley influence should be added where the alleys exist.

Rectangular Lots, Three-street Front.

Rule.—To calculate the value of lots having a frontage on three streets, consider them to front on the highest valued street and calculate values in the regular way.

Example 1.—What is the value of lot 1 (Fig. 106) which is located in a high-class retail district? The standard lot depth in the city is 100 ft.

Draw the lines 14-15 and 2-12 marking off the zones of corner influence 100 ft. square. Draw the line 18-19 as determined by the ratio $\frac{3\text{-}18}{11\text{-}18} = \frac{800}{500}$ whence 3-18 = 123.08 ft. and 11-18 = 76.92 ft.

Parcel 1-2-15-14.

BV = 100 (ft. frontage on Main St.) × $800 (Main St. *BV*) = $80,000.
CIV = 100 (ft. frontage on Side St.) × $400 (Side St. *A BV*) × 80% (100 ft. frontage on Main St., Table 175) = $32,000.

$$V = \$80{,}000 + \$32{,}000 = \$112{,}000.$$

Parcel 12-13-14-15.
PV = 100 (ft. frontage on C St.) × $500 (C St. *BV*) = $50,000.
CIV = 100 (ft. frontage on Side St. *A*) × $400 (Side St. *A BV*) × 80% (100 ft. frontage on C St.) = $32,000.

$$V = \$50{,}000 + \$32{,}000 = \$82{,}000.$$

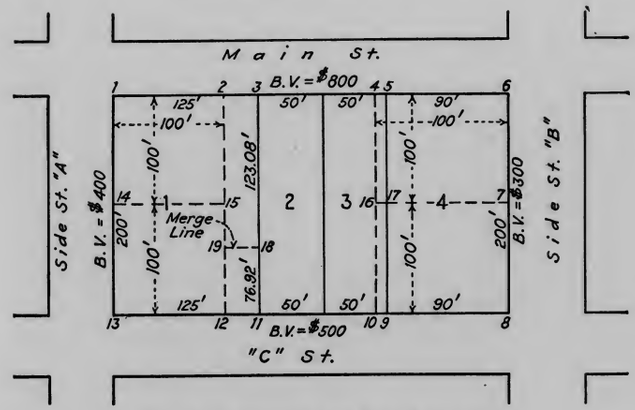


FIG. 106.—Rectangular lots, three-street front.

Parcel 2-3-18-19.
PV = 25 (ft. frontage on Main St.) × $800 (Main St. *BV*) × 106.1% (123.08 ft. depth, Table 168) = $21,220.
Parcel 11-12-19-18.
PV = 25 (ft. frontage on C St.) × $500 (C St. *BV*) × 91.7% (76.92 ft. depth, Table 168) = $11,462.
For lot 1, we have

$$V = \$112{,}000 + \$82{,}000 + \$21{,}220 + \$11{,}462 = \$226{,}682.$$

Example 2.—What is the value of lot 4 (Fig. 106) which is located in a high-class retail district? The standard lot depth is 120 ft.

Draw the lines 7-16 and 4-10 marking the zones of corner influence 100 ft. square.

Parcel 5-6-7-17.
PV = 90 (ft. frontage on Main St.) × $800 (Main St. *BV*) × 95.4% (depth of 100 ft., Table 168) = $68,688.

CIV = 100 (ft. frontage on Side St. B) × $300 (Side St. B *BV*) × 78.2% (90 ft. frontage on Main St., Table 175) = $23,460.
For parcel 5-6-7-17,

$$V = \$68,688 + \$23,460 = \$92,148.$$

Parcel 7-8-9-17.
PV = 90 (ft. frontage on C St.) × $500 (C St. *BV*) × 95.4% (depth of 100 ft., Table 168) = $42,930.
CIV = 100 (ft. frontage on Side St. B) × $300 (Side St. B *BV*) × 78.2% (90 ft. frontage on C St., Table 175) = $23,460.
For parcel 7-8-9-17, we have

$$V = \$42,930 + \$23,460 = \$66,390.$$

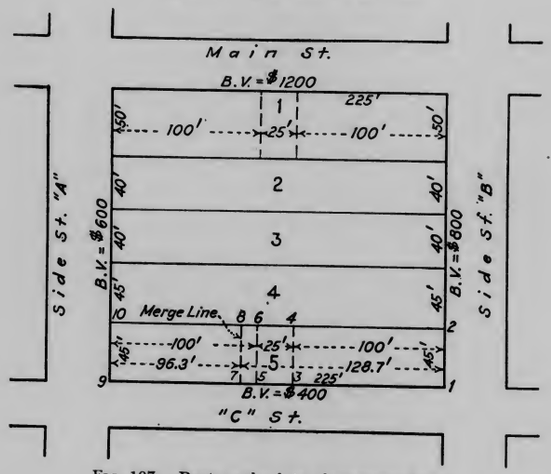


FIG. 107.—Rectangular lots, three-street front.

For lot 4, we have

$$V = \$92,148 + \$66,390 = \$158,538.$$

Example 3.—What is the value of lot 1 (Fig. 107) where the lot is located in a high-class retail business district and the standard lot depth is 100 ft.?

Consider the lot to front on the high-value street. Then,
PV = 225 (ft. frontage on Main St.) × $1,200 (Main St. *BV*) × 76.8% (50 ft. depth, Table 168) = $207,360.
The total corner influence value from side street A is
CIV = 100 (ft. frontage on Side St. A) × $600 (Side St. A *BV*) × 80% (100 ft. frontage on Main St., Table 175) = $48,000.
For 50 ft. frontage on side street A, the corner influence is
CIV = $48,000 × 70% (50 ft. frontage on Side St. A, ratio of *BV* 2:1, Table 176) = $33,600.

The total corner influence value from side street B is
CIV = 100 (ft. frontage on Side St. B) × $800 (Side St. B *BV*) × 80% (100 ft. frontage on Main St., Table 175) = $64,000.

For 50 ft. frontage on side street *B*, the corner influence is
CIV = $64,000 × 69.5% (50 ft. frontage on Side St. B, ratio of *BV* 1½:1, Table 176) = $44,480.
For lot 1, we have

$$V = \$207,360 + \$33,600 + \$44,480 = \$285,440.$$

Example 4.—What is the value of lot 5 (Fig. 107) where the lot is located in a high-class retail business district and the standard lot depth is 100 ft.?

Draw the lines 3-4, 5-6, 7-8 as shown.

Line 7-8 is the merge line 96.3 ft. distant from side street A.

The value of lot 5 can be calculated in two ways and the highest value should govern. In method 1 the value is determined by dividing lot 5 into two parcels by the merge line 7-8 and figuring primary values for parcel 1-7-8-2 fronting on side street B and parcel 9-10-8-7 fronting on side street A. The corner influence is determined in the usual manner. In method 2 the value is determined by dividing lot 5 into three parcels: 1-3-4-2 fronting on side street B; 9-10-6-5 fronting on side street A; and 3-5-6-4 fronting on C street. The corner influence is determined in the usual manner.

Method 1. *Parcel* 1-7-8-2.
PV = 45 (ft. frontage on Side St. B) × $800 (Side St. B *BV*) × 107.25% (depth of 128.7 ft., Table 168) = $38,610.
CIV = 100 (ft. frontage on C St.) × $400 (C St. *BV*) × 59.2% (45 ft. frontage on Side St. B, Table 175) = $23,680.
For parcel 1-7-8-2, we have

$$V = \$38,610 + \$23,680 = \$62,290.$$

Parcel 9-10-8-7.
PV = 45 (ft. frontage on Side St. A) × $600 (Side St. A *BV*) × 98.8% (depth of 96.3 ft., Table 168) = $26,676.
CIV = 100 (ft. frontage on C St.) × $400 (C St. *BV*) × 59.2% (45 ft. frontage on Side St. A, Table 175) = $23,680.

NOTE.—3.7 ft. of C.I.V. is from parcel 1-7-8-2.

For parcel 9-10-8-7, we have

$$V = \$26,676 + \$23,680 = \$50,356.$$

For method 1, we have

$$V = \$62,290 + \$50,356 = \$112,646.$$

Method 2. *Parcel* 1-3-4-2.
PV = 45 (ft. frontage on Side St. B) × $800 (Side St. B *BV*) = $36,000.
CIV = same as method 1 = $23,680.
For parcel 1-3-4-2, we have

$$V = \$36,000 + \$23,680 = \$59,680.$$

Parcel 9-10-6-5.
PV = 45 (ft. frontage on Side St. A) × $600 (Side St. A *BV*) = $27,000.
CIV = same as method 1 = $23,680.

For parcel 9-10-6-5, we have

$$V = \$27,000 + \$23,680 = \$50,680.$$

Parcel 3-5-6-4.

PV = 25 (ft. frontage on C St.) × $400 (C St. *BV*) × 73%
(45 ft. depth, Table 168) = $7,300.

For method 2, we have

$$V = \$59,680 + \$50,680 + \$7,300 = \$117,660,$$

which is the value of lot 5.

Triangular Lots, One-street Front, Base on Street.

Rule.—The value of any triangular lot having its base fronting on the street is equal to the value of the projected rectangular lot having the same width and depth and multiplied by the percentage given in Table 178.

TABLE 178.—VALUE OF TRIANGULAR LOTS, ONE-STREET FRONT, BASE ON STREET

Length of lot perpendicular to street, feet	Percentage of rectangular lot value
10	50.0
15	53.0
20	55.5
25	57.0
30	58.0
35	58.5
40	59.0
45	59.5
50	60.0
55	60.5
60	61.0
65	61.5
70	62.0
75	62.5
80	63.0
85	63.5
90	64.0
95	64.5
100	65.0
105	65.5
110	66.0
115	66.5
120	67.0
125	67.5
130	68.0
135	68.5
140	69.0
145	69.5
150	70.0
175	72.5
200	73.5
225	75.5
250	77.5
275	78.3
300	79.0

Example 1.—The property shown in Fig. 108 is located in an ordinary retail business district. The standard lot depth is 100 ft. What is the value of lot 9?

The value of a rectangular lot having a frontage of 141.5 ft. on main street and a depth of 70 ft. would be:

V = 141.5 (ft. frontage on Main St.) × $75 (Main St. *BV*) × 86.3%
(70 ft. depth, Table 169) = $9,158.

From Table 178 we find that for a depth of 70 ft. the value of the triangular lot is 62.0% of the value of the rectangular lot; therefore, for lot 9, we have:
V = \$9,158 (value of rect. lot) × 62.0% (Table 178) = \$5,678.

Example 2.—What is the value of lot 16 A shown in Fig. 108?

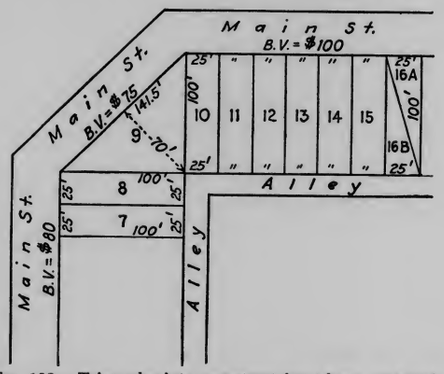


FIG. 108.—Triangular lots, one-street front base, on street.

The value of lots 16 A and 16 B would be:
V = 25 (ft. frontage on Main St.) × \$100 (Main St. BV) = \$2,500.

From Table 178 we find that for a depth of 100 ft. the value of the triangular lot is 65% of the value of the rectangular lot. Therefore, for lot 16 A we have:
V = \$2,500 (value of rect. lot) × 65% (Table 178) = \$1,625.

Triangular Lot, One-street Front, Apex on Street.

Rule.—The value of any triangular lot having its apex on the street line is the difference in value between the projected rectangular lot having the same width and depth, and the triangular lot of equal dimensions having its base fronting on the street.

Example 1.—What is the value of lot 16 B (Fig. 108)?

The value of the rectangular lots 16 A and 16 B = \$2,500.

The value of lot 16 A = \$1,625.

Therefore, for the value of lot 16 B, we have:
V = \$2,500 (value of lots 16 A and 16 B) − \$1,625 (value of lot 16 A) = \$875.

Triangular Lots, Two-street Front.

Rule.—To determine the value of a triangular lot fronting on two streets, divide the lot into two triangular lots by means of a merge line and calculate the value of each in the regular manner.

Example 1.—What is the value of lot 1 (Fig. 109)? The property is located in an ordinary retail business district and the standard lot depth is 125 ft.

To determine the merge lines for lots 1 and 16 draw the line XZ where $AX = AZ$ which is any convenient distance.

For lot 16:

$$\frac{XY}{YZ} = \frac{1,000}{500}.$$

For lot 1:

$$\frac{XY}{YZ} = \frac{750}{500}.$$

This determines the location of the point Y. Extend AY to B.

Draw the line AB as heretofore described. Then, for lot 1, BC = 34.4 ft. and BD = 51.6 ft.

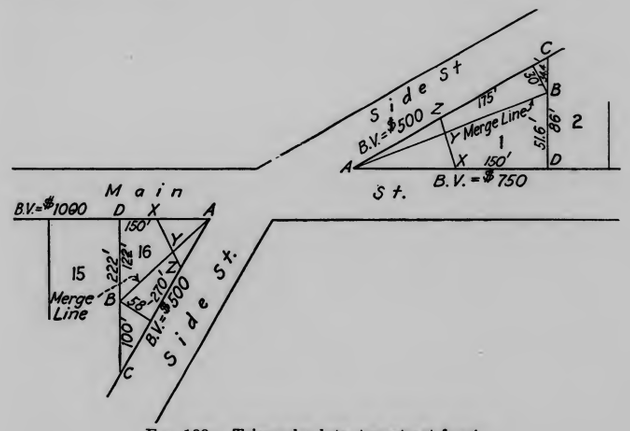


FIG. 109.—Triangular lots, two-street front.

Parcel ABD.

V = 150 (ft. frontage on Main St.) × \$750 (Main St. BV) × 63.35% (51.6 ft. depth, Table 169) × 60.16 % (51.6 ft. depth for triangular lot, Table 178) = \$42,875.

Parcel ABC.

V = 175 (ft. frontage on Side St.) × \$500 (Side St. BV) × 44.5% (30 ft. depth, Table 169) × 58.0% (30 ft. depth for triangular lot, Table 178) = \$22,584.

For lot 1, we have:

$$V = \$42,875 + \$22,584 = \$65,459.$$

Example 2.—What is the value of lot 16 (Fig. 109)?

Draw the merge line AB as heretofore described, where BC = 100 ft. and BD = 122 ft.

Parcel ABD.

V = 150 (ft. frontage on Main St.) × \$1,000 (Main St. BV) × 99.22% (depth of 122 ft., Table 169) × 67.2% (depth of 122 ft. triangular lot, Table 178) = \$100,014.

Parcel ABC.

V = 270.0 (ft. frontage on Side St.) × \$500 (Side St. BV) × 68.3% (depth of 58 ft., Table 169) × 60.8% (depth of 58 ft. triangular lot, Table 178) = \$56,061.

For lot 16, we have:

$$V = \$100{,}014 + \$56{,}061 = \$156{,}075.$$

Triangular Lots, Three-street Front.

Rule.—To determine the value of triangular lots having a street frontage on all sides, divide the lot into three triangular lots by means of merge lines, each lot having its base on a street. Calculate the value of the three triangular lots in the usual manner.

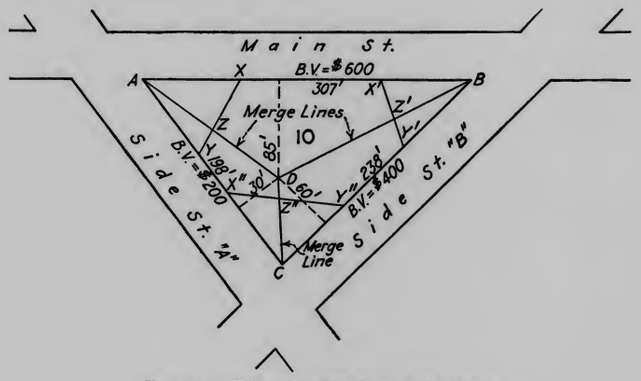


FIG. 110.—Triangular lots, three-street front.

Example 1.—What is the value of block 10 (Fig. 110) which is located in an ordinary retail business district? The standard lot depth is 100 ft.

Referring to Fig. 110, draw the lines XY, $X'Y'$ and $X''Y''$ making $AX = AY$; $BX' = BY'$; $CX'' = CY''$ which may be any convenient distances. Then,

$$\frac{XZ}{YZ} = \frac{\$600}{\$200}; \frac{X'Z'}{Y'Z'} = \frac{\$600}{\$400}; \frac{X''Z''}{Y''Z''} = \frac{\$200}{\$400}.$$

Extend the lines AZ BZ' and CZ'' to meet at D.

The lines AD, BD and CD are merge lines and trisect the triangle ABC into three triangles, the values of which will be calculated in the usual manner.

Parcel ABD.

V = 307 (ft. frontage on Main St.) × \$600 (Main St. BV) × 93.6% (depth of 85 ft., Table 169) × 63.5% (depth of 85 ft. triangular lot, Table 178) = \$109,481.

Parcel BCD.

V = 238 (ft. frontage on Side St. B) × \$400 (Side St. B BV) × 80.5% (depth of 60 ft., Table 169) × 61.0% (depth of 60 ft. triangular lot, Table 178) = \$46,748.

Parcel ACD.

V = 198 (ft. frontage on Side St. A) × \$200 (Side St. A BV) × 54.9% (depth of 30 ft., Table 169) × 58.0% (depth of 30 ft., Table 178) = \$12,609.

For block 1, we have

$$V = \$109{,}481 + \$46{,}748 + \$12{,}609 = \$168{,}838.$$

Example 2.—What is the value of block 6, (Fig. 111)? The block is located in an ordinary retail business district where the standard lot depth is 120 ft.

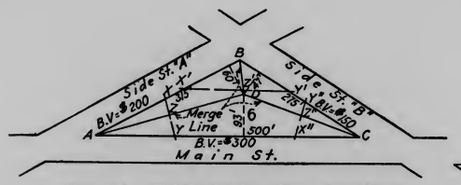


FIG. 111.—Triangular lot, three-street front.

Draw the lines XY, $X'Y'$, $X''Y''$, making $AX = AY$; $BX' = BY'$; and $CX'' = CY''$, which may be any convenient distances. Then,

$$\frac{XZ}{YZ} = \frac{\$200}{\$300}; \frac{X'Z'}{Y'Z'} = \frac{\$200}{\$150}; \frac{X''Z''}{Y''Z''} = \frac{\$300}{\$150}.$$

Extend the lines AZ, BZ' and CZ'' to meet at D.

The lines AD, BD and CD are merge lines and trisect the triangle ABC into three triangles, the value of which will be calculated in the usual manner.

Parcel ABD.

V = 315 (ft. front on Side St. A) × \$200 (Side St. A BV) × 74.8% (depth of 60 ft. Table 169) × 61.0% (depth of 60 ft. triangular lot, Table 178) = \$28,746.

Parcel BCD.

V = 275 (ft. frontage on Side St. B) × \$150 (Side St. B BV) × 65.3% (depth of 47 ft., Table 169) × 59.7% (depth of 47 ft. triangular lot, Table 178) = \$16,081.

Parcel ACD.

V = 500 (ft. frontage on Main St.) × \$300 (Main St. BV) × 92.2% (depth of 93 ft., Table 169) × 64.3% (depth of 93 ft. triangular lot, Table 178) = \$88,927.

For block 6, we have

$$V = \$28,746 + \$16,081 + \$88,927 = \$133,754.$$

Irregular Inside Lots.

Rule.—To calculate the value of irregular inside lots divide them into parcels having regular shapes and calculate in the usual manner.

Example 1.—What is the value of lot 6 (Fig. 112) which is located in an apartment district where the standard lot depth is 125 ft.?

Divide the lot into parcels *ABCD* and *ADE*.

Parcel ABCD.

V = 140 (ft. frontage on Main St.) × \$100 (Main St. *BV*) × 108.4% (depth of 140 ft. lot, Table 170) = \$15,176.

Parcel ADE.

V = 45 (ft. frontage on Main St.) × \$100 (Main St. *BV*) × 108.4% (depth of 140 ft. lot, Table 170) × 69% (depth of 140 ft. triangular lot, Table 177) = \$3,366.

For lot 5, we have:

$$V = \$15,176 + \$3,366 = \$18,542.$$

Example 2.—What is the value of lot 7 (Fig. 112) considering the same to be located in an ordinary retail business district where the standard lot depth is 120 ft.?

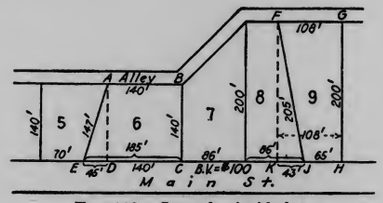


FIG. 112.—Irregular inside lots.

The average depth of the lot is $\frac{140 + 200}{2}$ = 170 ft. Therefore the value will be the same as a lot having a frontage of 86 ft. on main street and a depth of 170 ft.

V = 86 (ft. frontage on Main St.) × \$100 (Main St. *BV*) × 108.5% (depth of 170 ft., Table 169) = \$9,331.

Example 3.—What is the value of lot 9 (Fig. 112) considering the same to be located in a residence district where the standard lot depth is 100 ft.?

Draw the line *FK* parallel with *GH*.

The value of lot 9 will be equal to the parcel *FGHK* minus the value of parcel *FJK*.

Parcel FGHK.

V = 108 (ft. frontage on Main St.) × \$100 (Main St. *BV*) × \$150% (depth of 200 ft., Table 173) = \$16,200.

Parcel FJK.

V = 43 (ft. frontage on Main St.) × \$100 (Main St. *BV*) × 150% (depth of 200 ft Table 173) × 73.5% (depth of 200 ft. triangular lot. Table 178) = \$4,741.

For lot 9, we have:

$$V = \$16,200 - \$4,741 = \$11,459.$$

Irregular Business Corners.

Rule.—To calculate the value of irregular business corner lots, divide the lot into regular shaped parcels and figure the base value accordingly. Figure the corner influence for the entire influence zone and apply to lots in the regular manner where the angle of the street intersection is less than 135 deg.; where the angle is greater than 135 deg., apportion the corner

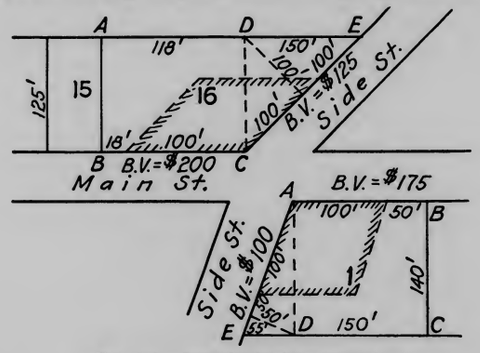


FIG. 113.—Irregular business corners.

influence in direct proportion to the area that each lot has within the influence zone.

Example 1.—What is the value of lot 16 (Fig. 113) where the base value on main street is \$200 and the base value on side street is \$125? The lots are located in a high-class retail business district. The standard lot depth is 125 ft.

Divide lot 16 into a rectangle *ABCD* and a triangle *CDE* and determine the value of each in the usual manner.

Parcel ABCD.

V = 118 (ft. frontage on Main St.) × \$200 (Main St. *BV*) = \$23,600.

Parcel CDE.

V = 200 (ft. frontage on Side St.) × \$125 (Side St. *BV*) × 93.5% (depth of 100 ft. rectangular lot, Table 168) × 65% (depth of 100 ft. triangular lot, Table 178) = \$15,194.

CIV = 100 (ft. frontage on Side St.) × \$125 (Side St. *BV*) × 80% (100 ft. frontage on Main St. Table 175) = \$10,000.

For lot 16, we have:

$$V = \$23,600 + \$15,194 + \$10,000 = \$48,794.$$

Example 2.—What is the land value of lot 1 (Fig. 113) where the value per front foot on main street is $175 and the value per front foot on side street is $100? The lot is located in a high-class retail district and the standard lot depth is 125 ft.

Divide the lot into the rectangle *ABCD* and the triangle *ADE* and determine the value of each in the usual manner.

Parcel ABCD.

V = 150 (ft. frontage on Main St.) × $175 (Main St. *BV*) × 102.9% (depth of 140 ft., Table 168) = $27,011.

Parcel ADE.

V = 150 (ft. frontage on Side St.) × $100 (Side St. *BV*) × 67.5% (depth of 50 ft. rectangular lot, Table 168) × 60% (depth of 50 ft. triangular lot, Table 178) = $6,075.

CIV = 100 (ft. frontage on Side St.) × $100 (Side St. *BV*) × 68% (100 ft. frontage on Main St., Table 177) = $6,800.

For lot 1, we have:

$$V = \$27,011 + \$6,075 + \$6,800 = \$39,886.$$

Curved Front Corner Lots, Rectangular Shaped.

Rule.—To figure the value of a curved front corner lot having a rectangular shape, convert the lot into a rectangle by dividing the area by the depth to get the width of the rectangle. Figure the value of the rectangle in the usual manner.

NOTE.—The property shown in Fig. 114 is located in a fully improved residence district and the standard lot depth is 125 ft.

Example 1.—What is the value of lot 20, block 4 (Fig. 114)? The computed area of this lot is 3,034 sq. ft. The depth is 82 ft. Therefore the width of the equivalent rectangular lot is 37 ft. The area of the circular segment 6-7-8 equals the area of the triangular segment 1-2-8 plus the area of the triangular segment 4-5-6.

PV = 37 (ft. frontage on C St.) × $50 (C St. *BV*) × 76.4% (depth of 82 ft., Table 173) = $1,413.

Use the rule and add 50% to the value of the corner 25 ft., then:

CIV = $1,413 (*PV* of lot) × $\frac{25}{37}$ (*PV* for 25 ft.) × 50% (for corner influence) = $477.

For lot 20, block 4, we have:

$$V = \$477 + \$1,413 = \$1,890.$$

Example 2.—What is the value of lot 1, block 4 (Fig. 114)?

The computed area of the lot is 2,850 sq. ft.

The depth is 75 ft.; therefore the width of the equivalent rectangular lot is 38 ft. The area of the triangular segment 1-2-7 is equal to the area of the triangular segment 5-6-7.

PV = 38 (ft. frontage on Main St.) × $100 (Main St. *BV*) × 71.3% (depth of 75 ft., Table 173) = $2,710.

CIV = $2,710 (*PV* of lot) × $\frac{25}{38}$ (*PV* for 25 ft.) × 50% (for corner influence) = $891.

For lot 1, block 4, we have:

$$V = \$2,710 + \$891 = \$3,601.$$

Curved Front Lots, Triangular Shaped, 90 Deg. Angle.

Rule.—To find the value of a curved front corner lot which is triangular shaped having a 90 deg. angle between one street line and the interior lot line, convert the lot into an equivalent triangle and figure according to the rule for triangular lots having a frontage on two streets.

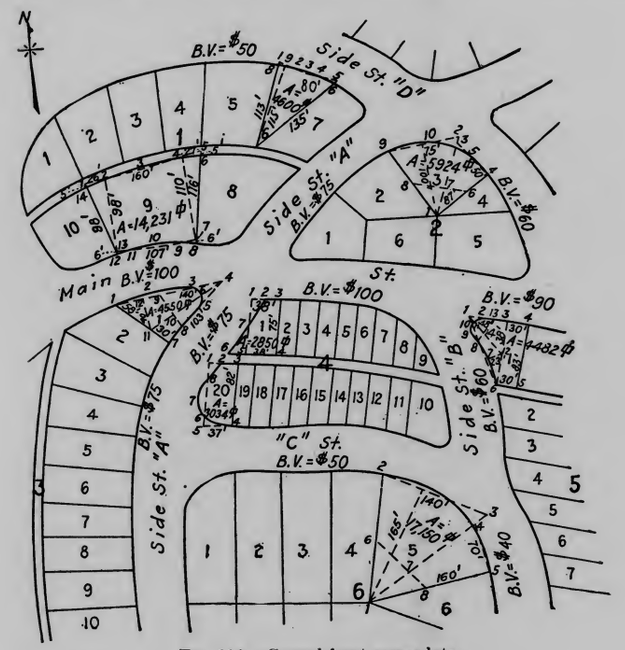


FIG. 114.—Curved front corner lots.

Example 1.—What is the value of lot 1, block 3 (Fig. 114)?

The computed area of the lot is 4,550 sq. ft. Consider the lot to front on the high-value street. The depth is 65 ft.; therefore the width of the equivalent triangular lot is 140 ft. The area of the circular segment 1-2-3 is equal to the area of the triangular segment 3-4-5-6.

Make 4-9 = 4-8 which is any convenient distance.

Draw the line 8-9.

Then:

$$\frac{9\text{-}10}{8\text{-}10} = \frac{\$100}{\$75}.$$

Draw the line 4-10-11.

Parcel 1-4-11.

Draw the perpendicular 11-12 = 40 ft. V = 140 (ft. frontage on Main St.) × $100 (Main St. BV) × 41.9% (depth of 40 ft., Table 173) × 59.0% (depth of 40 ft. triangular lot) = $3,461.

Parcel 4-7-11.

V = 103 (ft. frontage on Side St. A) × $75 (Side St. A BV) × 32.5% (depth of 30 ft., Table 173) × 58.0% (depth of 30 ft. triangular lot, Table 178) = $1,456.

For lot 1, block 3, we have:

$$V = \$3,461 + \$1,456 = \$4,917.$$

Example 2.—What is the value of lot 1, block 5 (Fig. 114)?

The computed area of the lot is 4,482 sq. ft. The depth is 83 ft. The area of the segment 1-2-11-10 plus the area of the segment 6-7-8 equals the area of the segment 8-9-10.

Divide the lot into three parcels, 3-4-5-6; 1-3-12; and 1-6-12. 1-13 = 1-8. Draw the line 8-13.

Then:

$$\frac{13\text{-}14}{8\text{-}14} = \frac{\$90}{\$60}.$$

Draw the line 1-14-12.

Parcel 3-4-5-6.

V = 30 (ft. frontage on Main St.) × $90 (Main St. BV) × 77.1% (depth of 83 ft., Table 173) = $2,082.

Parcel 1-3-12.

V = 48 (ft. frontage on Main St.) × $90 (Main St. BV) × 40% (depth of 38 ft., Table 173) × 58.8 %(depth of 38 ft. triangular lot, Table 178) = $1,016.

Parcel 1-6-12.

V = 95 (ft. frontage on Side St. B) × $60 (Side St. B BV) × 25.4% (depth of 23 ft., Table 173) × 56.4% (depth of 23 ft. triangular lot, Table 178) = $817.

For lot 1, block 5, we have:

$$V = \$2,082 + \$1,016 + \$817 = \$3,915.$$

Curved Front Corner Lots, Triangular Shaped, Angle Less than 90 Deg.

Rule.—To find the value of a curved front corner lot which is triangular shaped, where the angle is less than 90 deg. at the interior apex, divide the lot into two triangles by means of a merge line and figure the value of each in the usual manner.

Example 1.—What is the value of lot 3 block 2 (Fig. 114)?

Measure off the distance 1-8 = 1-6 and draw the line 6-8.

Then:

$$\frac{6\text{-}7}{7\text{-}8} = \frac{\$60}{\$75}.$$

Draw the line 1-7-2. Draw the lines 4-3 and 9-2 so that the front areas balance.

Parcel 1-2-9.

V = 75 (ft. frontage on Side St. A) × $75 (Side St. A BV) × 88.1% (depth of 100 ft., Table 173) × 65.0% (depth of 100 ft. triangular lot, Table 178) = $3,221.

Parcel 1-3-4.

V = 50 (ft. frontage on Side St. D) × $60 (Side St. D BV) × 79.9% (depth of 87 ft., Table 173) × 63.7% (depth of 87 ft. triangular lot, Table 178) = $1,527.

For lot 3, block 2, we have:

$$V = \$3,221 + \$1,527 = \$4,748.$$

Example 2.—What is the value of lot 5, block 6 (Fig. 114)?

Measure off 1-6 = 1-8 and draw the line 6-8.

Then:

$$\frac{6\text{-}7}{7\text{-}8} = \frac{\$50}{\$40}.$$

Draw the line 1-7-3. Draw the lines 2-3 and 4-5 so that the front areas are balanced.

Parcel 1-2-3.

V = 140 (ft. frontage on C St.) × $50 (C St. BV) × 112.4% (depth of 165 ft., Table 173) × 71.5% (depth of 165 ft. triangular lot, Table 178) = $5,626.

Parcel 1-4-5.

V = 70 (ft. frontage on Side St. B) × $40 (Side St. B BV) × 111.2% (depth 160 ft., Table 173) × 71.0% (depth 160 ft. triangular lot, Table 178) = $2,211.

For lot 5, block 6, we have:

$$V = \$5,626 + \$2,211 = \$7,837.$$

Curved Front, Triangular Shaped, Inside Lot.

Rule.—To calculate the value of a curved front triangular shaped inside lot, convert the lot into a triangle with balanced front areas and a total area equal to the area of the lot itself and calculate in the usual manner.

Example 1.—What is the value of lot 6, block 1 (Fig. 114)?

The computed area of lot 6 is 4,600 sq. ft. Draw the line 1-5 so that the area 1-2-8 plus the area 4-5-6 equals the area 2-3-4. Draw the line 7-9 perpendicular to the line 1-5.

V = 80 (ft. frontage on Side St. D = line 1-5) × $50 (Side St. D BV) × 95.9% (depth of 115 ft., Table 173) × 66.5% (depth of 115 ft. triangular lot, Table 178) = $2,551.

Curved Front Rectangular or Trapezoidal Shaped Inside Lot.

Rule.—To calculate the value of a curved front, rectangular or trapezoidal shaped inside lot, convert it into a rectangle or a trapezoid with balanced front and rear areas equal to the area of the lot itself and figure in the usual manner.

Example 1.—What is the value of lot 9, block 1 (Fig. 114)?

The computed area of lot 9 is 14,231 sq. ft. Draw the line 1-5 such that the area 1-2-14 plus the area 4-5-6 equals the area 2-3-4. Draw the line 7-13 such that the area 7-8-9 plus the area 11-12-13 equals the area 9-10-11.

Divide the lot into three parcels, the triangles 1-2-13 and 4-5-7 and the trapezoid 2-4-7-13.

Parcel 1-2-13.

Calculate the value of a rectangular lot having a frontage equal to 1-2 (26 ft.) on main street and a depth of 98 ft.

V = 26 (ft. frontage on Main St.) × \$100 (Main St. *BV*) × 86.9 % (depth of 98 ft., Table 173) = \$2,259.

Referring to Table 178, we find that the value of the triangular lot (base on street) is 64.8 % of the value of the rectangular lot for a depth of 98 ft. Therefore the value of the triangular lot 1-2-13 would be equal to 35.2 % of the value of the rectangular lot as determined above and we have, for parcel 1-2-13,

$$V = \$2,259 \times 35.2\% = \$795.$$

Parcel 4-5-7.

Calculate first the value of a rectangular lot having a frontage equal to 4-5 (27 ft.) on main street and a depth of 110 ft.

V = 27 (ft. frontage on Main St.) × 100 (Main St. *BV*) × 93.5 % (depth of 110 ft., Table 173) = \$2,525.

Referring to Table 178 we find that the value of the triangular lot (base on street) is 66 % of the value of the rectangular lot for a depth of 110 ft. Therefore the value of the triangular lot 4-5-7 would be equal to 34 % of the value of the rectangular lot as determined above, and we have, for parcel 4-5-7,

$$V = \$2,525 \times 34\% = \$859.$$

Parcel 2-4-7-13.

V = 107 (ft. frontage on Main St.) × \$100 (Main St. *BV*) × 90.3 % (average depth of 104 ft., Table 173) = \$9,662.

For lot 9, block 1, we have

$$V = \$795 + \$859 + \$9,662 = \$11,316.$$

Appraisal of Farm Land.—During the period immediately following the war, 1919 and 1920, it seemed as though the ambition of most men was to own a parcel of land. Our population indulged in a general scramble to obtain title to land which already had an inflated value due to food demands during the war. The result was that, in 1920, farm land prices reached an unwarranted peak and then declined sharply. A glance at Fig. 116 readily shows the extreme inflations of 1920 and the extreme deflations which followed. During the period of readjustment many farm loan companies suffered severe losses, some farm loan organizations went bankrupt and thousands of farmers lost their farms.

Stability is just being reached in farm land prices, and, in seeking tests for present values, the appraiser must deal very warily with any actual sales prices since 1918. In general it

may be said that actual sales prices paid for farms since 1918 must be adjusted before being used to determine present value.

The real value of a farm may not consistently be determined by any set of rules nor by mathematical calculations for the simple reason that the elements of experience and judgment are fundamental requirements in determining farm values.

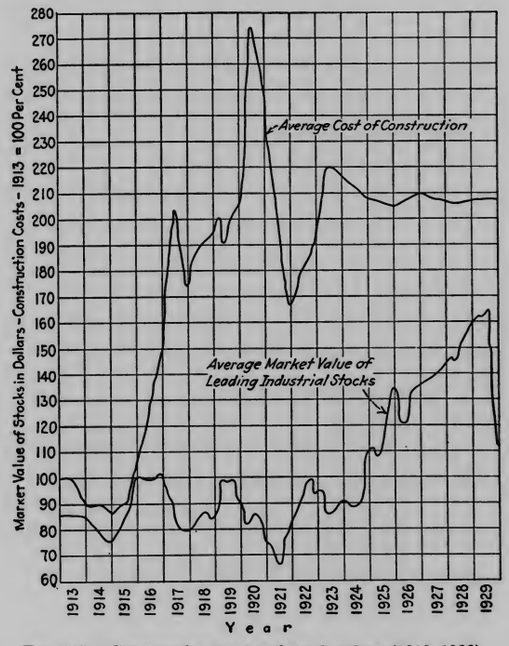


FIG. 115.—Construction costs and stock values (1913–1930).

Mathematical Appraisal.—Some loan companies apply a rather severe mathematical test which tends to protect their loans but which seldom agrees with the actual value of the farm. These companies state that the value of a farm is "twenty times the net average annual return from crop rents, after deducting taxes, insurance, depreciation and maintenance." Suppose a renter sells the crops from a farm for \$2,400 and the owner

TABLE 179.—FLUCTUATION IN FARM LAND VALUES[1]
1912 to 1928, as of March 1 (1912–1914 = 100 Per Cent)

Geographic division and state	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929
United States	97	100	103	103	108	117	129	140	170	157	139	135	130	127	124	119	117	116
Geographic divisions:																		
New England	99	101	100	99	102	112	117	123	140	135	134	130	128	127	128	127	127	126
Middle Atlantic	98	100	102	100	104	112	117	121	136	127	118	116	114	114	113	111	110	109
East North Central	97	100	103	103	110	116	127	135	161	151	132	128	121	116	111	104	101	100
West North Central	97	100	103	105	114	122	134	147	184	174	150	142	132	126	121	115	113	112
South Atlantic	98	100	103	98	108	119	135	161	198	174	146	152	151	148	149	137	134	133
East South Central	97	100	103	99	109	120	140	162	199	163	149	149	142	141	139	133	130	129
West South Central	96	100	104	100	103	116	134	143	177	159	136	132	136	144	144	139	137	136
Mountain	98	102	100	98	98	106	117	130	151	133	122	115	110	105	103	101	101	101
Pacific	94	99	106	107	111	122	129	134	156	155	151	148	147	146	144	143	142	142
New England:																		
Maine	100	102	98	96	98	110	115	124	142	132	127	129	127	124	126	124	124	122
New Hampshire	97	101	102	101	98	103	111	116	129	123	126	111	109	111	113	112	112	111
Vermont	101	101	98	104	115	127	133	136	150	150	145	134	130	125	126	125	123	123
Massachusetts	98	100	102	98	100	110	114	119	140	134	134	132	131	132	134	131	131	131
Rhode Island	100	101	100	102	106	112	118	123	130	130	127	124	126	128	130	133	134	134
Connecticut	98	100	102	100	102	110	116	121	137	134	140	137	140	137	137	138	139	139
Middle Atlantic:																		
New York	98	100	102	100	103	109	115	118	133	123	116	115	112	111	109	108	106	105
New Jersey	98	100	102	100	102	111	115	119	130	130	121	115	120	124	129	128	127	127
Pennsylvania	98	100	102	100	105	114	119	124	140	131	120	118	116	114	114	112	111	110
East North Central:																		
Ohio	98	100	102	107	113	119	131	135	159	134	124	122	118	110	105	99	96	94
Indiana	98	100	102	101	110	116	128	135	161	147	119	115	108	102	95	87	84	83
Illinois	97	100	103	102	105	111	119	130	160	153	126	123	116	115	109	99	96	95
Michigan	98	99	103	105	111	120	134	137	154	152	148	145	138	133	129	127	125	124
Wisconsin	97	100	103	104	117	124	133	143	171	168	154	147	139	130	125	122	120	119
West North Central:																		
Minnesota	95	100	105	107	122	138	155	167	213	212	187	177	170	159	155	145	140	138
Iowa	96	99	104	112	128	134	145	160	213	197	162	156	143	136	130	121	117	116
Missouri	97	100	103	102	108	115	125	137	167	156	133	127	117	112	104	99	96	95
North Dakota	97	100	103	103	112	118	124	130	145	141	136	128	114	109	105	100	99	98
South Dakota	96	101	103	101	108	116	126	145	181	173	146	126	117	115	107	97	96	95
Nebraska	98	100	102	101	104	110	127	145	179	166	144	139	128	123	123	119	117	116
Kansas	101	99	99	103	109	115	122	132	151	149	130	127	118	115	113	113	113	113
South Atlantic:																		
Delaware	100	101	99	100	105	115	124	129	139	129	119	119	107	112	114	111	111	111
Maryland	97	100	103	104	109	118	129	136	166	146	141	136	133	131	130	126	124	123
Virginia	97	100	103	97	117	125	142	167	189	180	157	170	162	154	148	138	137	136
West Virginia	97	100	103	101	104	112	122	135	154	141	125	127	125	120	116	110	109	108
North Carolina	97	99	104	102	114	130	152	176	223	196	166	195	192	187	185	178	174	171
South Carolina	101	98	101	94	98	107	122	162	230	186	126	128	136	138	128	113	110	110
Georgia	98	101	101	94	105	116	131	172	217	172	136	125	123	116	112	104	102	101
Florida	96	99	105	97	103	109	126	143	178	176	157	155	163	172	223	183	176	174
East South Central:																		
Kentucky	97	100	103	100	111	127	146	170	200	172	151	147	141	140	139	134	130	129
Tennessee	96	100	104	100	110	121	145	168	200	169	154	158	148	137	134	130	127	125
Alabama	98	98	103	98	98	103	128	143	177	147	135	143	144	154	154	145	145	143
Mississippi	97	102	102	97	111	121	131	155	218	150	148	143	134	136	134	126	123	122
West South Central:																		
Arkansas	98	101	101	95	109	129	149	169	222	186	174	170	160	160	153	150	147	145
Louisiana	99	102	99	95	106	112	143	157	198	163	140	144	137	141	143	135	132	132
Oklahoma	98	101	101	95	104	114	130	140	166	160	139	133	125	131	130	128	127	127
Texas	95	100	105	103	103	115	133	141	174	156	133	128	137	146	146	141	139	138
Mountain:																		
Montana	97	100	103	100	94	100	106	114	126	105	96	87	81	75	72	70	71	72
Idaho	100	101	99	96	99	114	130	146	172	162	136	133	129	123	119	117	116	116
Wyoming	97	103	100	103	94	97	121	147	176	146	134	121	112	100	95	94	95	96
Colorado	98	103	98	93	102	107	110	118	141	132	123	113	98	92	89	82	82	82
New Mexico	100	104	96	100	96	111	118	127	144	125	115	110	110	108	106	108	108	109
Arizona	95	100	105	97	95	105	125	140	165	148	135	124	128	121	125	123	122	123
Utah	100	102	98	98	104	117	122	144	167	137	133	133	131	130	129	128	127	127
Nevada	96	100	103	102	99	96	103	117	135	123	119	112	108	102	99	99	99	99
Pacific:																		
Washington	98	100	103	100	102	112	118	122	140	132	124	117	115	113	112	111	110	110
Oregon	97	100	103	99	100	104	112	118	130	130	122	115	113	110	107	106	106	106
California	93	99	108	111	116	130	136	142	167	168	166	165	164	164	163	162	161	160

[1] U. S. Dept. of Agriculture, "Yearbook," 1928.

receives one-third or $800. The net return to the owner will be $800 minus $170 for taxes minus $150 for insurance, repairs and depreciations or $480, and the value of the farm will be twenty times $480 or $9,600. It is obvious that during a good year this same farm might, mathematically, be worth $25,000 and during a poor year it might be worth nothing. The value measured by providing subsistence and having made a home for the tenant is also ignored. If the owner lives on the farm the same computations are applicable.

If we wish to get at the fundamentals of farm land values we must ask ourselves, "What factors are considered by the experienced appraiser when he values a farm?"

Elements of Value.—The elements of farm value are not the same in all parts of the country nor do the same elements have

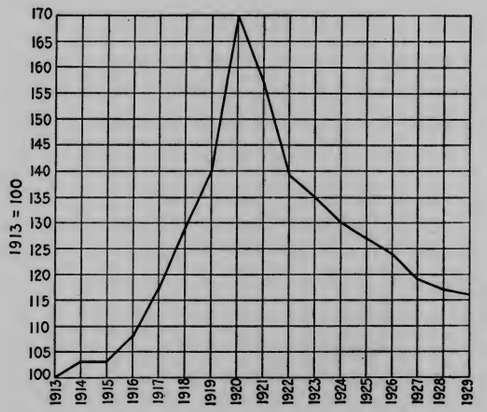


FIG. 116.—Average farm land value in the entire United States (1913–1930) by U. S. Department of Agriculture.
NOTE.—For any particular state see table.

the same weight in all parts of the country, but, in general, the twelve factors to be considered are as follows:

1. Value of crops and timber resources.
2. Fertility of soil.
3. Adaptability of soil to different crops.
4. Topography and drainage.
5. Location of property.

6. Accessibility to market and transportation facilities.
7. Character of neighborhood, including schools and churches.
8. Improvements.
9. Present condition of property.
10. Marketability and loan value.
11. Rental value.
12. Water rights of irrigated farms.

The man who can give proper weight and value to the stated factors is an experienced appraiser and his appraised value of a farm will be more reliable than the value obtained by mathematical calculations or by reference purely to sales.

Table 179 and Fig. 116 show the fluctuations in farm land value since 1913. These values were obtained by annual correspondence with a selected number of prominent farmers, bankers, realtors, etc.

CHAPTER XXIII

ASSESSORS' VALUATION OF INDUSTRIAL PLANTS

Value.—The legal definition which describes market value as "the cash sale value fixed by an owner willing, but not obliged to sell and agreed upon by a purchaser willing, but not obliged to buy" is seldom truthfully reflected in the actual sale prices of industrial properties. The present tendency toward mergers and consolidations, where stock in the new organization is given to purchase the old property, results in sale prices so erratic that true cash value is seldom reflected. Again, the present great demand for public utility properties has often resulted in sale prices of old properties exceeding their reproduction cost new.

A sale of an industrial property often includes "going concern" value, patent rights, goodwill, valuable concessions, favorable contracts or operating franchises, and a breach is opened between physical value and sale price. If a firm is prosperous, it does not want to sell except for a bonus; if it is bankrupt, it often sells at a bargain upset price; and in neither case is true value measured. When Dodge Bros., automobile manufacturers, was purchased by capitalists, it was reported that an allowance of many millions of dollars, in stock, was paid for goodwill.

It is therefore readily understood that a law requiring property to be assessed at its actual value, its real value, its cash value, its fair cash value, its market cash value or its full cash value does not mean its "transaction value" where cash paid represents but a fraction of the sales price, nor does it mean the all cash price paid at a forced sale. With our American system of financing, it is rare indeed, that the purchase of an industrial property is a full cash transaction. Of course, where it is possible to determine the full cash value of an industrial plant by referring to known fair cash sales or to an unquestionable cash market for such properties, the assessor best complies with the law by so determining the value; but he must remember that comparative sales prices of similar industries are often absurdly inconsistent and in general should be ignored in trying to determine actual

cash value. Therefore in our effort to find what the hypothetical willing seller would receive from the hypothetical willing buyer, remembering the transaction must be cash, we can find no starting point so stable and dependable as the present physical value.

When appraisals of public utilities are made for rate making purposes, it is customary to add 10 per cent to the total plant value because the industry is a going concern. The United States Supreme Court has repeatedly recognized:

> That there is an element of value in an assembled and established plant doing business and earning money over one not thus advanced is self-evident. This element of value is a property right and should be considered in determining the value of a property upon which the owner has a right to make a fair return when the same is privately owned, although dedicated to public use.

In fact, any industrial concern which has perfected an organization and attached to itself a business in the way of an established trade or clientele has added an element of value, and a competitive concern just starting up must make an expenditure before acquiring the intangible values of a perfected organization and an established business. This intangible value is not generally taxable.

A tax assessor is often confused when an industrial property sells at a figure greatly above the assessed value. He has not the information at hand from which to fathom the intricacies of patent rights, goodwill, etc., and often the problem is left unsolved. The fair and equitable way to assess industrial properties is to begin with an appraisal determining present physical value—reproduction cost minus depreciation, obsolescence and inadequacy. In most cases the value so determined is the fair assessable value for tax purposes. Any additional value due to going concern, patent rights, goodwill, etc., may be determined by capitalizing the net earnings, preferably over a period of five years or more, at a fair rate, and any excess of this capitalized value over the appraised value represents the intangible value. This intangible value may or may not be subject to taxation according to the laws of the state.

Capitalized value is the value determined by the probable net profits. It is computed by dividing the actual annual net profits by a selected rate of capitalization. The rate of capitalization is an earnings percentage figure representing the hazard of the

investment. In other words, it is the rate of net profits a given business should earn under normal conditions.

To compute the proper rate of capitalization, one must begin with the normal interest rate on well-secured loans and then add a profit rate sufficient in the eyes of brokers to compensate for the hazards of the particular business being considered. The profit rate on millinery should be much greater than the profit rate on leather goods; the profit rate on amusement parks should be much greater than on dry goods; and the profit rate on beet-sugar factories should be much greater than on steel plants. In addition to hazards involved, if a proper depreciation reserve has not been deducted before computing net profits, the capitalization rate should be sufficient to properly cover depreciation, obsolescence and inadequacy.

Efforts have been made to develop a rational method for determining the proper capitalization rate where stocks are listed on the New York stock exchange. It was thought that over a period of years the effect of frenzied speculation would be absorbed in the general equilibrium of stocks and that the average market price of any stock would have a ratio to earnings which represented the hazard of the investment. In other words, it was thought the proper rate of capitalization would be the average annual earnings available for common stock dividends divided by the average market quotations of the stock. The results of these studies have been a complete disappointment. The dynamic nature of bull and bear markets, the intangible effect of management on stock values, the existing money rate, the custom of expanding business out of earnings and the policy of retiring bonds and preferred stock out of earnings—all have a direct effect on the market value of stocks and an instability results which defies mathematical calculation.

To determine value by capitalizing net earnings, suggested rates of capitalization are shown in Table 180.

The appraisal method for determining industrial tax values is considered impossible by some assessors because of the detail work involved, but the fact that some cities have such a system co pleted and applied proves it is not an impossibility. Some tax lawyers and tax agents seek to avoid the positive results of an appraisal because it does not leave them enough latitude for obtaining lower taxes. The statement is unhesitatingly made that the appraisal method of taxing industrial properties, with

its tangible evidence of existing value, is the most equitable method in use and is the easiest way to satisfy the business executive that his firm is being equitably assessed. There is no other common yardstick by which all industrial plants may be measured, and there is nothing so satisfying to a taxpayer as the knowledge that his assessment is equitable and computed by a method which has been applied to all similar properties.

TABLE 180.—NET CAPITALIZATION OF EARNINGS

Description of business	Rate of capitalization, per cent
Permanent business with profits assured	5 to 7
Permanent business with small risk	6 to 8
Permanent business with average risk	7 to 10
Business operating under franchise	8 to 10
Business protected by tariff or of equal uncertainty	10 to 14
Business affected by climatic conditions, crop failures, etc.	12 to 16
Business with high risk and subject to frequent failures	14 and up

The system requiring an assessor to place a value on an industrial property solely by determining the market value of the stocks and bonds of the company is, unquestionably, a weak and inadequate system. In 1920 cash market prices of equipment reached a peak, while market prices of stocks and bonds were approaching bottom (see Fig. 115). Fluctuations in the market may cause a stock to be doubled or halved in market value without any change in the physical value or earning power of the property. The market value of any stock is the price at which a fractional amount of the total stock may be purchased. If 100 per cent of the stock is to be purchased, the sale price may be considerably above or below the market value. Frequently, a large new factory is built out of surplus and added to the plant of a corporation without any change in the market value of the corporation's stocks and bonds. The new factory is certainly a taxable unit, but the assessor would not tax it by assessing on a basis of market value of stocks and bonds. The aggregate market value of stocks and bonds with assets other than plant assets deducted will remain a possible test rule, but to use it

as a primary rule unsupported would result in unequalized tax burdens.

Book values as maintained by accounting departments of some organizations are often considered as representing present value. When depreciation is fairly allowed and all equipment has been purchased approximately at present prices, such book values are reasonably accurate. Book values are based on original cost of equipment, and, when low pre-war prices or peak post-war prices enter, book values become unreliable. Some firms have adjusted their book values to suit the results of recent engineering appraisals, and such book values should be fairly reliable.

Appraisals of plant equipment made by assessors for taxation purposes need not be exhaustive in detail. Foundations may be estimated from observation and overall dimensions; installation dates of machines may be determined from general inquiry among employees or from company records; installation costs may be generalized into a percentage of the cost of the machines; normal life tables may be used and other short cuts may be formulated. Any question of doubt should be resolved in favor of the taxpayer.

On large projects, such as central power stations, steel plants, large factories, etc., the construction overheads are rather definitely established and may be generally summarized as shown in Table 181:

TABLE 181.—CONSTRUCTION OVERHEAD

Description	Percentage of total cost
Engineering and supervision	5.00
Organization and administration	2.75
Legal expense	0.25
Taxes and insurance	0.50
Interest during construction	5.50
Preliminary operation and adaptation	0.25
Omissions and contingencies	0.50
Total	14.75

When small plants are being considered, some of the items given are non-existent and the appraiser must determine the proper overheads for the plant in question.

The value of machinery is diminished by depreciation, obsolescence and inadequacy, although the term "depreciation" has been loosely used to cover all three conditions. The six most common methods for computing depreciation of machinery for taxation purposes are:

1. *The straight-line method* which gives the machine a predetermined life and then diminishes its value by an equal amount each year so that it will have a scrap value only, at the end of its predetermined life (see Fig. 117).
2. *The unit of production method* which assumes a machine can produce a certain predetermined number of units of work and then provides equal depreciation for each unit done.

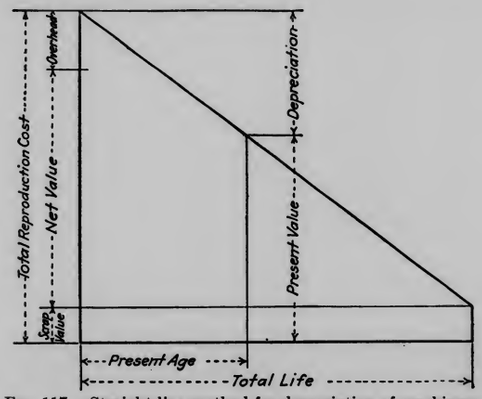


FIG. 117.—Straight-line method for depreciation of machinery.

3. *The job method* for single purpose or special purpose machines where the total depreciation is the difference between the original cost of the machine and its salvage value when it has served its purpose, and the depreciation is spread equally over the number of estimated jobs that will ultimately be turned out.
4. *The diminishing-value method* where the depreciation rate is applied to the value of the previous year rather than to the original cost. The older the machine the less the annual depreciation, and the present valve curve flattens out and never equals zero.
5. *The sinking-fund method* where the total depreciation of a plant is assumed to be the total amount accumulated in a sinking fund into which an annual amount is placed, which, with compound interest, would equal the cost of the machine when its life is lived.
6. *The per cent condition method* where, by inspection, a machine is given a percentage of its original value regardless of age.

The assessor is primarily interested in the straight-line method of depreciation. If a machine is given a 25-year life, it will depreciate 4 per cent each year until, at the end of 25 years, it will have only a scrap or salvage value. Theoretically, this salvage value should be deducted from the first cost to obtain the amount subject to depreciation; but, with general averages of salvage value ranging from 10 per cent to zero, the assessor may usually ignore salvage value and depreciate the entire first cost. Exception should be made of machines having considerable copper or other materials with a high scrap value.

A machine still in use and serving its purpose has a utility value of at least 20 per cent of its first cost, and, regardless of age,

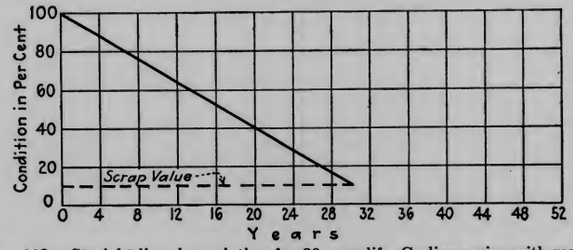


FIG. 118.—Straight-line depreciation for 30-year life, Corliss engine with maintenance included in depreciation.

should not be assessed at less than 20 per cent. Again, if repairs have been sufficient to extend the normal life of the machine or improvements have eliminated obsolescence, the assessor should see that the present value of the machine reflects these conditions, and the per cent condition method should be applied or the life estimate lengthened (see Fig. 120).

In proposing the straight-line method for assessors, the writers are fully aware of the fact that this method has several shortcomings and lacks refinement; but it is simple in application, and, if the life tables are extended when warranted by repairs or improvements (see Figs. 118, 119, 120), the method is entirely tenable for the purpose of appraising for taxation.

Obsolescence of machinery is the loss in value of a machine because of the invention or introduction of an improved machine which will perform the same work better or cheaper (see Fig. 121). Obviously, obsolescence may render one machine useless and have

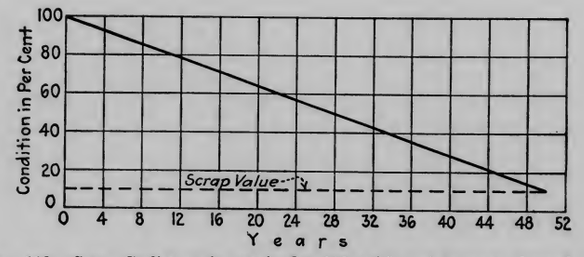


FIG. 119.—Same Corliss engine as in fig. 118, with maintenance charged to plant expense, giving 50-year life.

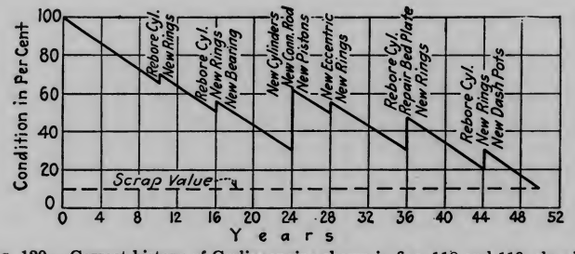


FIG. 120.—Correct history of Corliss engine shown in figs. 118 and 119, showing actual present value at any period in its life.

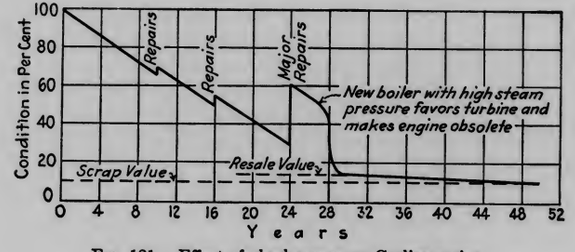


FIG. 121.—Effect of obsolescence on Corliss engine.

no effect upon another; so obsolescence should be considered where it exists and not generally applied to all machinery. A practically new machine in perfect mechanical condition may be reduced to scrap value because a better machine has been invented. Many machinery manufacturers will scrap a comparatively new machine, capable of performing two operations, and replace it with a machine which will perform four operations. The blazoned trail of American supremacy in automobile manufacturing is lined with obsolete machines. When an obsolete machine is continued in use because it is not entirely valueless, its appraised value should be reduced to a point where it is as economical to operate the old machine as it would be to invest additional capital and receive the benefits of the new machine. An entire plant may suffer obsolescence if it is too large or too small for the possible demand for its services, or if it is built for one industry and then diverted to use in an industry for which it is not suited.

Inadequacy occurs when a machine is insufficient in size to operate to the best advantage. If the production of a plant is curtailed because one machine is the "neck of the bottle," so to speak, that machine should be charged with inadequacy. The deduction in value of the machine due to inadequacy may be estimated by considering the economical loss caused by the inability of the machine and the cost of replacing it with one of adequate capacity. An entire plant may suffer from inadequacy, and it is sometimes necessary to move plants to new locations before inadequacy can be overcome.

If a plant is closed down with no liklihood of ever starting up again, the equipment is worth no more than its second-hand sale value. If the equipment cannot be used for any other purpose, it has only junk value. If the plant can be started up again for a different manufacturing purpose, however, it should be given a suitable utility value. If the plant is only temporarily shut down because of lack of orders, court instructions, reorganization or business misfortunes, the equipment should be valued as though the plant were in operation.

Occasionally plants exist which contain a number of special machines invented and developed by the plant owner to expedite his particular manufacturing operations. Enormous sums are often spent developing particular machines which would be worthless for other uses. In valuing such equipment the

appraiser should be guided by the profits produced by the machines and give them whatever portion of their actual cost seems justifiable.

The following forms showing a detail sheet and a summary sheet have been used extensively and are recommended to the assessor for use in appraising mechanical equipment:

Firm name Great Western Sugar Co.
Business Sugar Manufacture
Address Brighton Factory Date of appraisal Jan. 15, 1930
Machine or unit Vacuum Pan Drip Pump No. of units 2
Name plate data or description Deming make 4″ × 6″ triplex double acting. Pumps 12472–3, 5″ suction, 4″ discharge

Year built 1918 Total estimated life 36 years
Year purchased (new or second-hand) 1918 new
Motor data (motor attached or separate) Attached motor 7½ hp. G. E. a.-c. induction motor, 1,200 r.p.m. 440 volt 3 phase 60 cycle

Cost of unit.
Factory cost 2 @ $586.25 = $1,172.50
Freight 3,600 lb. @ $1.22 = $ 46.36
Erection cost = $ 460.00
Includes engineering, purchasing, insurance and contingencies

Cost of unit erected, exclusive of foundation and drive	$1,678.86
Cost of motor installed 2 @ $176.25	$ 352.50
Cost of tools and extra parts Extra drive gear and pinion	$ 56.00
Cost of drive details	$
	$
	$
	$
	$
	$
	$
Cost of foundation details	$
5 cu. yd. excavation @ $1.00 per cu. yd.	$ 5.00
6 cu. yd. concrete @ $15.00 per cu. yd.	$ 90.00
	$
Miscellaneous and remarks	$
These pumps serve White Vacuum Pan.	$
New plungers installed in 1928 extend probable life to 36 yrs.	$
	$
	$
Machine not in use	
Resale value	$
Scrap value	$
Total reproduction cost at present time	$2,182.36
Depreciation 12 years = 33⅓ %	$ 727.45
Obsolescence 0 %	$
Present value	$1,454.91

F. H. Prouty Appraiser.
A. F. Checked and Approved.

FIG. 122.—Manufacturing equipment, unit cost details.

Firm name Great Western Sugar Co.
Business Sugar Manufacture
Address Brighton factory Date of appraisal Jan. 15, 1930

Description	See sheet	Unit cost repro-duction	No. of units	Total reproduc-tion cost	Depreciation and obsoles-cence	Present value
Trash catcher	1	.....	2	$ 8,340.05	$ 2,752.21	$ 5,587.84
Beet wheel	2	.....	1	4,535.60	1,315.32	3,220.28
Beet washer	3	.....	1	7,238.00	1,809.50	5,428.50
Roller conveyor	4	.....	2	3,081.70	770.40	2,311.30
Beet elevator	5	.....	2	13,654.20	3,413.55	10,240.65
Picking table	6	.....	1	1,401.55	280.31	1,121.24
Beet scales	7	.....	1	3,177.45	1,588.72	1,588.73
Test scales	8	.....	1	690.00	172.50	517.50
Beet slicers	9	.....	2	11,590.00	4,636.00	6,954.00
Fraiser	10	.....	2	374.00	108.64	265.36
Router	11	.....	1	211.00	61.19	149.81
Jointer	12	.....	1	234.00	58.50	175.50
Cossette conveyor	13	.....	1	3,981.50	1,393.52	2,587.98
Diffusion batteries	14	.....	14	48,658.75	17,517.15	31,141.60
Measuring tank	15	.....	1	894.37	214.65	679.72
1st carbonation tank	16	.....	5	13,283.75	2,922.42	10,361.33
Milk of lime tank	17	.....	3	596.00	131.12	464.88
1st carb. rec. tank	18	.....	1	1,267.12	316.78	950.34
2d carb. rec. tank	19	.....	3	2,071.12	600.62	1,470.50
2d carb. presses	20	.....	3	11,935.00	2,625.70	9,309.30
1st carb. presses	21	.....	7	27,925.00	6,143.50	21,781.50
Lime cake conveyor	22	.....	2	5,627.50	1,537.15	4,090.35
Lime mud mixer	23	.....	1	1,330.50	345.93	984.57
Press excess tank	24	.....	1	396.87	99.21	297.66
Press wash tank	25	.....	1	611.12	152.78	458.34
Sweet water tank	26	.....	1	479.62	124.70	354.92
3d sat. tank	27	.....	2	2,713.75	1,248.32	1,465.43
Blow-up tank	28	.....	1	1,356.87	678.43	678.44
Sulphur stove	29	.....	2	1,052.75	663.23	389.52
High green press	30	.....	2	3,030.00	666.60	2,363.40
High wash press	31	.....	3	4,544.00	999.68	3,544.32
Thick juice press	32	.....	3	4,544.00	999.68	3,544.32
Thin juice press	33	.....	4	6,060.00	1,333.20	4,726.80
Lime scroll	34	.....	1	2,345.00	820.75	1,524.25
Thin juice tank	35	.....	1	377.00	90.48	286.52
1st evaporator	36	.....	1	9,825.00	2,849.25	6,975.75
2d evaporator	37	.....	1	9,825.00	2,849.25	6,975.75
3d evaporator	38	.....	1	9,031.88	2,619.24	6,412.64
4th evaporator	39	.....	1	9,031.88	2,619.24	6,412.64
Sheet totals	..	.....	..	$237,322.90	$69,529.42	$167,793.48

FIG. 123.—Summary Sheet.

In appraising public service properties, the per cent condition method is most frequently used.

Following is a complete appraisal of a central power station of the modern type. The boilers are 1,332 hp. operating at 350 lb. steam pressure. Pulverized coal is used as fuel. The turbines are 20,000 and 25,000 kw., respectively, and operate under high vacuum:

TABLE 182.—APPRAISAL OF 45,000 KW. CENTRAL POWER STATION
Using Per Cent Condition Method

Description	Reproduction cost installed	Per cent condition	Present value
Boilers: 4 Biglow Hornsby, 1,332 hp. boilers having combustion chamber for burning powdered coal. Includes attached fittings, instruments and meters	$ 179,127.00	88.0	$ 157,631.76
Boiler settings: For 4—1,332 hp. boilers	89,510.00	80.5	72,055.55
Boiler superheaters: For 4—1,332 hp. boilers	44,755.00	88.0	39,384.00
Boiler soot blower: 4 Diamond valve in head	4,178.60	75.0	3,133.95
Boiler fuel system: Lopulco pulverized coal system serving 4—1,332 hp. boilers	158,500.00	88.6	140,431.00
Coal dryers: Including breeching	9,700.00	81.0	7,857.00
Coal bunkers: For coal storage including gates, scale, hoppers and bunker covering	20,130.00	90.5	18,217.65
Coal hoist: Travelling hoist by Main Electric Co., including tower and bucket	58,428.00	90.5	52,877.34
Boiler stack: Brick on concrete base 375 ft. high, 16 ft. inside diameter at top	82,690.00	92.0	76,074.80
Cyclone: For dust	900.00	91.0	819.90
Ash sluice: From boilers to outside ash pit	4,480.00	90.4	4,049.92
Ash gates: Baker-Dundar-Allen 30″ × 30″ 4 sets	3,360.00	81.6	2,741.76
Boiler feed pumps: Worthington 5 stage 6 in. D. S. turbine driven, 2	12,320.00	90.0	11,080.00
Feed-water heater: Includes Elliot deaerator 320,000 lb. per hour	21,500.00	91.2	19,608.00
Boiler breeching: Including covering	18,160.00	90.5	16,434.80
Makeup water tank: Includes feed-water system	22,760.00	91.2	20,757.12
Blowoff tank: 4 ft. 0 in. dia. by 10 ft. 6 in. long	410.00	90.0	369.00
City water supply: 13,725 ft. 6-in. cast-iron pipe	31,516.25	96.0	30,255.60
Air compressor	1,852.00	88.6	1,640.87

TABLE 182.—APPRAISAL OF 45,000 KW. CENTRAL POWER STATION.—(*Continued*)

Description	Reproduction cost installed	Per cent condition	Present value
Generators:			
25,000 kw. Turbo generator, G. E. make with Curtis turbine, 9 stage, 350 lb. pressure, 1,845 r.p.m., 13,800 volts, 150 kw. exciter. Includes attached instruments, oiling and signal systems, foundations	$380,690.00	95.2	$362,416.88
20,000 kw. Westinghouse Turbo generator with turbine, 27 stage, 350 lb. pressure, 1,800 r.p.m., 13,800 volts. Includes attached instruments, oiling and signal systems, foundations	307,260.00	90.1	276,841.26
Condensers, surface:			
For 25,000 kw. generator, Wheeler 30,000 cu. ft. surface condenser, including circulating pump, auxiliaries, foundations	117,600.00	95.2	111,955.20
For 20,000 kw. generator, Westinghouse 30,000 cu. ft. surface condenser, including circulating pump auxiliaries, foundations	117,600.00	90.1	105,957.60
Electrical system: Wiring, conduits, switches, etc	52,416.00	90.0	47,174.40
Switchboards:			
Main switchboard for inside substation	22,150.00	91.1	20,178.65
Switchboard battery " "	1,170.00	92.0	1,076.40
Switchboard exciter " "	6,072.00	92.0	5,586.24
" primary control	2,180.00	92.0	2,005.60
" station service	11,600.00	92.0	10,672.00
Bus bars: Low tension	15,550.00	92.0	14,306.00
Transformers:			
Station service, including leads and piping	23,300.00	86.7	20,201.10
Step-up transformers	1,200.00	86.7	1,040.00
7,500 kva. for outside substation, for 7	85,905.00	88.6	76,111.83
Switching: Low tension, including batteries, oil circuit breakers and disconnecting switches	34,500.00	86.7	29,911.50
Motor generator set: For batteries, etc	15,230.00	88.6	13,493.78

TABLE 182.—APPRAISAL OF 45,000 KW. CENTRAL POWER STATION.—(*Continued*)

Description	Reproduction cost installed	Per cent condition	Present value
Oil breakers:			
For high-tension substation wiring, 44 kv., for 2	$1,910.00	86.7	$1,655.97
100 kv. for high-tension substation wiring, 3	53,525.00	86.7	47,423.15
Duct lines: For high-tension substation wiring	1,950.00	92.0	1,794.00
Switches: Air break for high-tension substation wiring	27,300.00	86.7	23,669.10
Lightening arresters: For high-tension substation wiring	710.00	92.0	653.20
Bus bars: For high-tension substation wiring	19,580.00	92.0	18,013.60
Transmission line 1:			
8 miles long.			
Preparing r. of w. $ 50 per mile			
Survey of " " " 30 " "			
Purchase of " " ..3,000 " "			
Transmission towers 8,000 " "			
Conductors, insulators and hardware 4,850 " "			
Overhead 15,200			
Total	142,640.00	92.0	131,228.80
Transmission line 2:			
3.8 miles long.			
Preparing r. of w. $ 160 per mile			
Survey of " " " 30 " "			
Purchase of " " 1,500 " "			
Conductors, insulators and hardware 5,700 " "			
Transmission towers 7,000 " "			
Overhead 6,500			
Total	61,182.00	92.0	56,287.44
Transmission line 3:			
8.15 miles long			
Preparing r. of w. $ 150 per mile			
Survey of " " " 50 " "			
Purchase of " " 2,800 " "			
Transmission towers 10,000 " "			
Conductors, insulators and hardware 4,300 " "			
Overhead 16,800			
Total	157,795.00	92.0	145,171.40

TABLE 182.—APPRAISAL OF 45,000 KW. CENTRAL POWER STATION.—(*Continued*)

Description	Reproduction cost installed	Per cent condition	Present value
Wiring, power: Wiring, conduits and switches	$60,370.00	92.0	$55,540.40
Crane: 100 ton Whiting with yoke	31,150.00	92.0	28,658.00
Plant site: 987 acres aver. cost $100 per acre	98,700.00	100.0	98,700.00
Pipe, valves and fittings:			
Pipe, valves, fittings $123,450			
Hangers and supports 6,400			
Covering 10,100			
Labor 30,862			
Overhead 22,205			
Total	193,017.00	90.0	173,715.30
Water rights: Reservoir and ditch rights	196,000.00	100.0	196,000.00
Intake from lake: Includes dock	44,200.00	92.1	40,708.20
Tunnels: Intake and discharge	130,110.00	92.8	120,742.08
Roadway to plant: 1,500 ft. long, gravel surface	7,280.00	80.0	5,824.00
Vacuum sweeping system	3,865.00	80.0	3,092.00
Telephone system: Inter-plant	820.00	90.0	738.00
Laboratory equipment	616.00	80.0	512.50
Safety-first equipment	588.00	80.0	470.40
Lockers: Steel	1,008.00	90.0	907.20
Furniture	2,800.00	88.6	2,480.80
Screens: For screen house	1,456.00	96.7	975.52
Stores material	47,000.00	85.0	39,950.00
Second-hand tools	800.00	50.0	400.00
Machine-shop equipment	10,517.00	88.0	9,254.96
Trackage:			
3,700 ft. std. gage including hopper			
Rails and Ties at $2.25 per lin. ft.			
Ballast " 0.40 " " "			
Labor " 0.40 " " "			
Embankment " 6.00 " " "			
Total	37,505.00	100.0	37,505.00
Locomotive crane: 30 ton with 1½-yd. bucket	10,430.00	86.7	9,042.81
Buildings:			
Main building	586,880.00	92.0	539,929.60
Coal handling building	126,000.00	92.0	105,920.00
Plant substation	43,900.00	92.0	40,388.00
Totals	$4,055,823.85		$3,710,699.89

Life of Equipment.—Table 183 giving the normal life of equipment is intended as a guide only. The life of a machine may be extended by proper housing, lubrication and maintenance, as it may be shortened by the improper application of the same factors. The table gives normal life, and, when a machine is inspected, it should be judged by its existing conditions. Any facts which tend to increase or decrease the normal life should be recorded and applied. Keeping these principles in mind and adhering to a minimum utility value of 20 per cent for any machine still performing its intended functions, the assessor may make use of normal life tables without sacrificing his major purpose, which is to secure equalization.

When a major improvement has been made on a machine and becomes an integral part of that machine, the value of the machine should be properly increased, but the probable life of the machine will not be increased unless the improvement extends the life of the entire unit. For instance, if new monolithic baffles are placed in an old boiler, they will increase its value but will not extend its life.

If the improvement consists of a unit which has a separate sale value, as when a 10-year old belt-driven pump is equipped with an individual motor drive and the improved unit is appraised 5 years later, then the normal service condition of the improved pump is computed by the method of weighted averages as follows:

Normal life of pump	25 years
Normal life of motor	28 "
The remaining life would be:	
Pump	10 years
Motor	23 "
The probable remaining life would be:	
Pump	10/25 or 40%
Motor	23/28 or 82.14%
The present reproduction cost new of each unit:	
Pump	$1,000 = 80%
Motor	250 = 20%
Total	$1,250 = 100%
The weighted values would be:	
Pump	40 × 80% = 32.00%
Motor	82.14 × 20% = 16.42%
Total	48.42%

So the appraised present value of the motor driven pump would be:

48.42% × $1,250 = $605.25.

TABLE 183.—NORMAL LIFE OF EQUIPMENT

Description	Average life, years	Description	Average life, years
Accumulators, hydraulic	20	Cars, hopper	20
Air hammers	12	" pullman	25
Ash pipe, vacuum system	3	" mine	9
Awnings	5	" refrigerator	15
Backfillers, power	6	" tank	20
Balers	10	Cash registers	12
Batteries, storage	18	Chains	20
Belting, canvas	12	Charging boxes, steel works	6
" rubber	12	Classifiers	12
" leather	18	Clocks, recording	7
Benches, coal gas	28	" watchmen's	8
Bending rolls	22	Clutches	20
Binders, grain	12	Coal & ash handling machinery	20
Blowers, gas plant	18	Chimneys, brick	50
" soot	65	" concrete	75
" ventilating	30	" steel guyed	15
Boilers, C. I. heating L. P.	35	" steel, self-supporting	25
" fire tube	25	Compressors, air	28
" hot water	35	" gas	25
" water tube	33	Concrete mixers	8
" waste heat	20	Condensers, barometric	30
Bolting chests, flour mill	12	" gas plant	30
Boosters, gas line	18	" ice mfg	12
Brake, sheet metal	25	" jet	20
Breechings, brick	25	" surface	25
" steel	18	Conduits, cast iron	100
Bridges, masonry & concrete	75	" fiber	30
" steel	22	" masonry	75
" wooden	12	" wood stave	33
Buckets, clamshell	12	" steel, large	50
Buildings, (see Chaps. IX to XIX)		" steel, small	30
Cables, aerial	25	Conveyors	20
" armored	33	Cooling towers	15
" copper	60	Core boxes	10
" feeder	25	Cranes, electric hoist	18
" telephone	33	" hand hoist	30
Can washers, milk	15	" locomotive	15
Cars, box	30	" traveling	30
" gondola	20		

TABLE 183.—NORMAL LIFE OF EQUIPMENT.—(*Continued*)

Description	Average life, years
Crossarms, electric transmission	14
Crushers	12
Cultivators, horse drawn	15
" power drawn	10
Culverts, concrete or masonry	75
" timber	18
" special steel	40
" vitrified pipe	38
Cupolas	16
Cutters, coal	6
" gear	30
" paper	20
" pipe	25
Dairy equipment	12
Dams, earth	100
" earth & loose rock	75
" concrete & masonry	100
Derricks, steel	18
" wood	12
Dictagraphs	15
Dies	4
Distribution system, street railway	22
Distribution system, public service	33
Docks	20
Draperies	12
Dredges	12
Drill presses, multiple	22
" " radial	28
" " vertical	30
Drydocks, masonry	40
" floating	20
Dust collecting systems	16
Economizers, fuel, cast iron	20
" " steel	15
Elevators, electric, bldg	20
" grain, concrete	50
" grain, wood	35
Elevators, hydraulic, bldg	25
Engines, chemical	20
" diesel	20
" fire	30
" gas	15
" hoisting	18
" steam Corliss	30
" " slide valve	28
" " uniflow	30
Equipment (average for all)	
" agricultural	12
" bakery shop	10
" blacksmith shop	25
" boiler house	25
" carpenter shop	30
" car shop	20
" cement mfg	25
" contractors	8
" creamery	12
" drilling, oil & gas	5
" electric	15
" laundry	12
" machine shop	28
" mining	15
" paper mill	30
" pattern shop	28
" printing	25
" refining oil	15
Excavators	10
Fans, forced draft	25
" induced draft	15
" mine ventilation	20
" ventilation	25
Fences, snow	12
" wire	15
" wood	12
Filters	18
Filter beds	35
" presses	40
Fire alarms	18

TABLE 183.—NORMAL LIFE OF EQUIPMENT.—(*Continued*)

Description	Average life, years
Fire extinguishers, hand	10
Flumes, concrete	50
" steel	22
" wooden	30
Furnaces, blast (new lining every 5 years)	25
Furnaces heating, small	10
" heating, large	15
" melting	15
" open hearth (new roof every 6 months	18
" open hearth, electric	15
Furniture and fixtures	25
Gages, pressure	20
Gas holders, steel tanks	45
Gas producers, blue gas	25
" " carbureted	25
" " coal gas, brick	28
" " steel plant	20
Generators, acetylene	12
" complete	..
" elect. engine drive	33
" " turbo "	30
" " hydro "	40
" motor sets	30
Governors, engine	25
" pump	20
" waterwheel	12
Graders, road	6
Grinders, swing for castings	15
" tool	30
Hammers, air	10
" drop	22
" steam	28
Heaters, feed water	25
" juice	35
" pre	20
Hoists, air	20
" chain	10
" electric	15
" gasoline	10
" hand	30
" steam	15
Hose, air	8
" fire	5
" steam	2
Ice boxes	10
" cans	10
Ice-cream mixers	10
Ice tanks	20
Jacks, hand	25
" hydraulic	20
Jigs	10
Jointer, wood	30
Key seater	30
Kilns brick mfg	20
" cement "	18
" lime "	25
Ladles, hot metal	10
Lamps, arc	15
" incandescent	5
Larries	15
Lathes machine shop	25
" carpenter shop	30
Linoleum	8
Lockers, steel	20
Locomotives, contractors	10
" electric	20
" freight	25
" gasoline	6
" passenger	25
" switching	25
Machines, adding	12
" automatic screw	15
" belt lacing	20
" bending rolls	30
" bending	15

TABLE 183.—NORMAL LIFE OF EQUIPMENT.—(*Continued*)

Description	Average life, years
Machines, boring	30
" broaching	30
" buffing	30
" calculating	10
" clay mixing	20
" cold saw	20
" cement mixing	8
" drilling	30
" drying	25
" ender	10
" engraving	20
" flanging	20
" flotation	12
" gear cutting	30
" key seating	30
" lacing	15
" lathes, machine	25
" lathes, carpenter	30
" milking	15
" pipe cutting	25
" pipe threading	25
" planer, metal	32
" printing	15
" refrigerating	20
" bandsaw, wood	30
" mechanical hack	25
" saw, wood	30
" screw	20
" sewing	20
" shaping, metal	25
" shearing	20
" slotting	25
" tensile testing	20
" threading	18
" water gas	25
" welding	12
" woodworking	30
Magnets, lifting	20
Manure spreaders	12
Meters, customers, electric	25
Meters, customers, gas	30
" customers, water	20
" pitot tube, recording	10
" orfice plate, recording	12
" venturi, recording	25
Microscopes	35
Milk cans	4
Mills, ball	12
" boring	30
" tube	12
Miller	30
Mortiser	30
Motors, electric	28
Motorboats	6
Oil separators	20
Organs, pipe	30
Ovens, bakery	12
" core	12
" drying brick	12
Patterns, wood	5
" metal	10
Pavements, asphalt	20
" brick	25
" cobblestone	30
" concrete	30
" wood block	30
Pianos, household	25
" rented	12
Piers	35
Pile drivers	12
Pipe covering	12
Pipe lines, ammonia	20
" " cast-iron mains	250
" " steel, under 2½ in. dia	25
" " steel, over 2½ in. dia	30
" " wood stave (except for acid conditions or electrolysis)	35

TABLE 183.—NORMAL LIFE OF EQUIPMENT.—(*Continued*)

Description	Average life, years
Planer, metal	32
" wood	30
Plows, common	20
" gang	18
" hand	20
" snow, railroad	20
Poles, cedar in earth	14
" cedar in concrete	18
" concrete reinforced	50
" pine creosoted	20
" steel or iron	50
Presses, arbor	20
" car wheel	33
" cylinder	15
" drill, vertical	30
" forging	25
" hydraulic	25
" punch	30
Pulp stackers	15
Pulleys and clutches	20
Pulverizers	10
Pumps, centrifugal	25
" mine	10
" plunger	30
" vacuum	25
Punches	20
Purifiers, gas plant	50
" water	20
Pyrometers	10
Rails, ties & bonding	13
Rakes, hay	15
Reapers	12
Recorders, clock operated	10
Regulators, feed water	20
" gas	30
" voltage	12
Retorts, gas mfg.	28
Retort setting	10
Riveters, hydraulic	20
" pneumatic	12
Riveters, steam	15
Roadmaking machy. grader	8
" " fresno	2
" " slip	2
" " wheel scraper	4
Rolling stock, contractors	12
" " mines	10
" " railroads	20
Rolls, bending & straightening	30
Roll trains, rolling mills	18
Rotary converters	28
Rumblers	15
Saddles for horses	10
Sand blasters	10
Saws, hot and cold	20
" hack, power driven	25
" wood, band or circular	30
Scales, bench	15
" platform	15
" wagon	20
" railroad	25
Scenery, theatrical	4
Screens, bolting, flour mill	5
" revolving, trommel	10
" shaking	12
" stationary	15
Scrubbers, gas plant	25
Separators, magnetic	15
" oil	20
" steam	20
Shafting & hangers	25
Shapers, metal	25
" wood	35
Shears, plate, large	25
" plate, small	15
" scrap	10
Sheet metal work machy.	25
Shovels, electric	12
" gasoline	6

TABLE 183.—NORMAL LIFE OF EQUIPMENT.—(*Continued*)

Description	Average life, years	Description	Average life, years
Shovels, snow	15	Traps, steam	20
" steam	15	Trestles, concrete	75
Shredders	12	" steel	50
Signboards, outdoor	15	" wood	15
Sleighs and sleds	20	Tunnels & subways	75
Slotter	25	Turbines, hydraulic	50
Snowsheds	25	" steam	30
Sprayers, insect	6	Turntables	15
Sprinklers, city street	20	Type, printers	20
" fire system	35	Typewriters	10
Stacks (see chimneys)		Valves, back pressure	20
Standpipes, concrete	50	" general use	20
" steel	35	" reducing	18
" wood	30	" safety	20
Stokers, fixed parts	20	" water gate	40
" moving parts	5	Ventilating systems	25
Sulphur stoves	5	Vises	15
Superheaters	30	Walls, retaining, concrete	45
Surfacers, woodworking	30	" " wood	10
Switchboards & wiring	35	Water softeners	15
Tanks, acid, wood	12	Water towers, factory	30
" air, steel	25	Waterwheels	40
" gas, steel	45	Weeders, horse drawn	15
" ice & brine, steel	20	Welding apparatus	10
" oil	25	Wells, gas	12
" water, steel	30	" oil	10
" water, wood	15	" water	35
Telephone systems	20	Wheelbarrows	3
Telephones	10	Whistles, steam	50
Tenoner	30	Wire, elec. feeder	50
Tents	4	" " home	35
Thickners	20	" " industrial	25
Tipples, coal, steel	25	" " insulated	25
" " wood	18	" " telephone	35
Ties, bonding & rails	13	" " trolley	25
Tractors	6	Woodworker	30
Transformers, elect. line	25	Wringers, rubber roll	6
Transmission lines	40		

Cost of Mechanical Equipment.—The equipment prices given in Table 184 are not list prices but average market prices. Individual purchases may cost more than the prices given, whereas large purchases may be made at a discount. The writer does not claim that manufacturers will always sell equipment at the prices recorded, but believes that the given prices are accurate enough to be used by assessors in the appraisal of mechanical equipment.

TABLE 184.—EQUIPMENT COSTS

Description	Weight, pounds	Factory price	Price, erected
Acetylene Generators			
15 lb. size 15 cu. ft. per hr. on truck, Imperial	.....	.....	$ 173
25 lb. size 25 cu. ft. per hr. on truck, Imperial	.....	.....	198
50 lb. size 50 cu. ft. per hr. on truck, Imperial	.....	.....	275
100 lb. size 100 cu. ft. per hr. on truck, Imperial	.....	.....	425
Arc Welder			
200 amp. M. G. portable	.....	.....	350
Bakery Equipment			
BAKE OVENS			
2 shelf Hubbard, coal fired	.....	.....	650
3 " Peck Co., electric oven	.....	.....	900
8 " Meek Oven Co., gas fired	.....	.....	900
10" × 12" Peterson oven	.....	.....	2,000
11' – 6" × 36", 12 shelves, reel type	.....	.....	3,100
12' – 6" × 42", " " " "	.....	.....	3,400
13' – 6" × 42", " " " "	.....	.....	3,700
BREAD WRAPPING MACHINES, POWER			
750 loaves per hr., Battle Creek Mach. Co., U	.....	.....	900
1,200 loaves per hr., Battle Creek Mach. Co., E	.....	.....	1,950
2,400 loaves per hr., Swigne Wrapping Co	.....	.....	3,500
CAKE MACHINE			
22" weiner	.....	.....	1,260
CAKE MIXER			
10 quart size	.....	.....	160
80 " "	.....	.....	453
CAN OPENER			
Automatic Nico Nai, No. 10 cans	.....	.....	225
CRACKER AND COOKIE CUTTER			
24" rolls, Day	.....	.....	4,350
26" " "	.....	.....	8,000
DOUGH BREAK			
26" rolls, Day	.....	.....	670

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Bakery Equipment (*Continued*)			
DOUGH MIXER			
1 bbl., Day, pulley driven	.....	.....	$ 330
1½ " " " "	.....	.....	380
2 " " " "	.....	.....	410
3 " " " "	.....	.....	565
5 " " " "	.....	.....	690
6 " " " "	.....	.....	770
1 " Century mixer	.....	.....	575
5 " American Oven Co	.....	.....	1,330
80 qt. Hobart, elec. driven	1,300	$ 610	
DOUGH PROOFER			
Dutchess proofer	.....	.....	2,194
DOUGHNUT MACHINE			
30" × 36" size	.....	.....	400
ENROBER			
16" enrober Nat'l. equip	.....	.....	2,100
24" " " "	.....	.....	4,300
FLOUR BLENDER			
2 bbl. size	.....	.....	380
70 " "	.....	.....	1,500
ICING MACHINE			
24" × 24" × 50", Day	.....	.....	525
MARSHMALLOW DEPOSITOR			
22" Westerman	.....	.....	8,890
MARSHMALLOW MIXER			
50 gal	.....	.....	460
LOAF MOLDING MACHINE			
8" size	.....	.....	363
10" "	.....	.....	759
PAN CONVEYORS			
Per lin. ft., installed	.....	.....	3.75
PIE-CRUST ROLLER			
Colburn make	.....	.....	400
ROLL DOUGH DIVIDER			
2 pocket, Werner & Pfeiderer	.....	.....	877
ROLL MACHINE			
Thompson make	.....	.....	150
ROTARY PIE MACHINE			
10 pie capacity	.....	.....	2,500
SOFT DOUGH MACHINE			
24", Day	.....	.....	3,100

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Bakery Equipment (*Continued*)			
STEAM JACKETED KETTLES			
150 lb. Nat'l. equip	.....	.....	$ 180
300 " " "	.....	.....	285
1,000 " " "	.....	.....	590
2,000 " " "	.....	.....	900
YEAST EMULSIFIER			
Carey make	.....	.....	165
Blowers			
1.5 cu. ft. per rev., Connersville type H	1,175	$ 321	
3.3 cu. ft. per rev., Connersville type H	1,800	451	
6 cu. ft. per rev., Connersville type H	3,000	588	
10 cu. ft. per rev., Connersville type H	4,450	858	
24 cu. ft. per rev., Connersville type S. F	8,000	1,370	
65 cu. ft. per rev., Connersville type S. F	21,000	2,840	
100 cu. ft. per rev., Connersville type S. F	31,800	4,070	
No. 1 Buffalo noiseless 12" high.	55	13	
" 2 " " 15⅛" " .	75	19	
" 3 " " 19 1/16" " .	95	27	
" 4 " " 23¼" " .	135	38	
" 5 " " 25¾" " .	180	46	
" 6 " " 29¼" " .	265	58	
" 7 " " 33" " .	308	73	
" 8 " " 38¼" " .	445	95	
" 9 " " 43⅝" " .	635	122	
" 10 " " 56 1/16" " .	820	168	
" 12 " " 75¼" " .	1,950	343	
Size 30 Clarage style C	650	125	
" 35 " " "	800	150	
" 40 " " "	900	175	
" 45 " " "	1,100	210	
" 50 " " "	1,450	250	
" 60 " " "	2,100	360	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Boiler House Equipment			
ASH CONVEYOR, STEAM JET			
8″ pipe, one steam jet with elbows	.....	.....	$ 150
Each intake	.....	.....	24
Pipe, per ft. with flanges & gaskets	.....	.....	7
Target box	.....	.....	40
COAL CONVEYORS			
20″ belt × 130′ long, Robins type with tripper and chute	11,500	.....	2,270
COAL CRUSHER			
24″ × 24″ single roll Jeffrey 40 tons per hr	6,500	$ 1,300	
ECONOMIZERS			
Per hp. installed, Green	.....	.....	8
FEED WATER HEATERS			
100 boiler hp., Worthington type	.....	.....	335
200 " " " " "	.....	.....	420
400 " " " " "	.....	.....	580
800 " " " " "	.....	.....	935
1,000 " " " " "	.....	.....	1,090
4,000 " " Cochrane or Hoppes type	20,000	3,000	
FEED WATER REGULATORS			
2½″ Copes type	.....	.....	120
SHAKING COAL FEEDER			
Duplex steel supports and skirtboards	8,500	.....	1,700
SOOT BLOWER			
350 hp. Diamond, valve-in-head type	.....	.....	300
STACKS			
4′0″ × 60′ steel with guys	5,000	.....	450
4′0″ × 100′ " " "	9,000	.....	780
5′0″ × 100′ " " "	14,500	.....	1,230
5′0″ × 150′ " " "	24,000	.....	2,020
6′0″ × 175′ steel, self-supporting	.....	.....	4,900
11′0″ × 200′ " " " brick lined	.....	.....	16,000
7′6″ × 175′ concrete	.....	.....	5,000
8′0″ × 175′ radial brick	.....	.....	8,000
12′0″ × 200′ radial brick	.....	.....	9,500
10′0″ × 230′ concrete	.....	.....	10,400
12′0″ × 250′ radial brick	.....	.....	15,200

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Boiler House Equipment (*Continued*)			
STOKERS			
Chain grate per boiler hp., 150% rating	110	.....	$ 9
Coxe type per sq. ft. grate surface	.....	.....	40
Type E per boiler hp., 150% rating	45	.....	10.50
Westinghouse type per boiler hp., 300% rating	60	.....	14
Jones type per boiler hp., 150% rating	45	.....	10.50
SUPERHEATERS			
100° F. superheat per boiler hp	190	$ 3.50	4.10
Boilers			
HORIZONTAL RETURN TUBULAR, 125 LB. PRESSURE			
45 hp. includes fronts, grates, trim, setting	10,950	595	1,135
50 hp. includes fronts, grates, trim, setting	11,850	660	1,210
60 hp. includes fronts, grates, trim, setting	13,050	740	1,400
80 hp. includes fronts, grates, trim, setting	17,850	990	1,860
100 hp. includes fronts, grates, trim, setting	19,450	1,230	2,230
125 hp. includes fronts, grates, trim, setting	23,400	1,520	2,770
150 hp. includes fronts, grates, trim, setting	25,500	1,820	3,320
180 hp. includes fronts, grates, trim, setting	29,400	2,030	3,830
200 hp. includes fronts, grates, trim, setting	31,800	2,290	4,190
225 hp. includes fronts, grates, trim, setting	34,000	2,550	4,700
250 hp. includes fronts, grates, trim, setting	36,800	2,860	5,160
HORIZONTAL WATER TUBE, 250 LB. PRESSURE			
50 hp. includes aver. found. & setting	12,000	1,600	1,750

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Boilers (*Continued*)			
75 hp. includes aver. found. & setting	17,500	$ 1,960	$ 2,480
100 hp. includes aver. found. & setting	22,500	2,330	3,200
125 hp. includes aver. found. & setting	27,000	2,710	3,880
150 hp. includes aver. found. & setting	31,000	3,080	4,730
175 hp. includes aver. found. & setting	34,600	3,450	5,480
200 hp. includes aver. found. & setting	39,200	3,840	6,000
250 hp. includes aver. found. & setting	47,600	4,600	7,480
300 hp. includes aver. found. & setting	55,000	5,340	8,960
350 hp. includes aver. found. & setting	63,100	6,100	10,400
400 hp. includes aver. found. & setting	70,500	6,850	11,800
450 hp. includes aver. found. & setting	79,500	7,600	13,300
500 hp. includes aver. found. & setting	87,000	8,360	14,700
600 hp. includes aver. found. & setting	100,000	9,860	17,500
700 hp. includes aver. found. & setting	116,000	11,200	20,400
800 hp. includes aver. found. & setting	131,000	12,800	23,250
1,000 hp. includes aver. found. & setting	162,000	15,900	28,900
1,200 hp. includes aver. found. & setting	193,000	18,700	34,500
Stoker, stack and breeching not included			
LOCOMOTIVE TYPE			
15 hp. complete with gages, valves, stack	4,900	790	
20 hp. complete with gages, valves, stack	5,800	870	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Boilers (*Continued*)			
25 hp. complete with gages, valves, stack	$ 6,500	$ 985	
30 hp. complete with gages, valves, stack	7,100	1,030	
40 hp. complete with gages, valves, stack	8,900	1,225	
50 hp. complete with gages, valves, stack	10,700	1,450	
60 hp. complete with gages, valves, stack	12,500	1,770	
VERTICAL TUBULAR, 100 LB. PRESSURE			
3 hp. includes fixtures, not stack	710	110	
4 " " " " " "	1,250	187	
6 " " " " " "	1,450	210	
10 " " " " " "	2,000	280	
15 " " " " " "	2,350	314	
20 " " " " " "	3,050	396	
25 " " " " " "	4,100	513	
30 " " " " " "	4,400	530	
40 " " " " " "	5,300	610	
50 " " " " " "	6,100	670	
VERTICAL WATER TUBE, 125 LB. PRESSURE			
100 hp. bare boiler	24,400	3,400	
150 " " "	30,000	4,070	
200 " " "	37,500	5,000	
250 " " "	45,000	5,870	
300 " " "	48,500	6,000	
350 " " "	56,500	6,600	
400 " " "	60,100	6,850	
450 " " "	65,500	7,200	
Box Making Machinery (Paper)			
BOX DIEING MACHINE			
30" × 42" bed	.....	.....	2,015
CORNER STAYING MACHINE			
No. 4 Knolton type	.....	.....	490
" 10 " "	.....	.....	682
CORRUGATING MACHINE			
60" Stokes & Smith Motor, Inc	.....	.....	8,000
CUTTING & GREASING PRESS			
18" × 28" Thompson type	.....	.....	2,250

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Box Making Machinery (Paper) (*Cont'd*)			
ENDING MACHINE			
Standard size	.....	.....	$ 900
GLUEING MACHINE			
18″ Stokes & Smith make	.....	.....	300
No. 24 Baldwin type	.....	.....	730
LACING MACHINE			
Stokes & Smith make	$ 700	.....	500
LITHOGRAPH MACHINE			
Fuchs & Lang make	.....	.....	600
PAPER CUTTER			
32″ Diamond make	.....	.....	450
PAPER SLITTER			
Hobbs type	600	.....	500
SCORE MACHINE			
40″ Robinson single	.....	.....	200
45″ " "	.....	.....	400
43″ " double	.....	.....	1,200
SHEETER			
26″ Parry make	.....	.....	690
SHOULDER PRESSING MACHINE			
Stokes & Smith make	.....	.....	400
SKIVING MACHINE			
Fortuna type	.....	.....	300
SLOTTING MACHINE			
Staude Co. type	.....	.....	965
STENCIL MACHINE			
Stokes & Smith make	1,800	.....	800
WRAPPING MACHINE			
Stokes & Smith, model A	2,500	.....	2,000
Broom Stitcher			
Lipe-Walrath type	.....	.....	500
Compressors			
AIR			
3″ × 3″ Gardner type	85	40	
3½″ × 4″ Ingersoll Rand	190	98.40	
9″ × 7″ × 9″ Westinghouse simple	650	162	
9″ × 10″ Cross compound locomotive	1,725	400	
8″ × 8″ Curtis type	.....	600	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Compressors (*Continued*)			
10″ × 10″ Ingersoll ER 1 type	4,800	$ 1,170	
12″ × 12″ " " " "	7,000	1,665	
10″ × 6½″ × 8″ Imperial type 10	5,600	1,515	
12″ × 8″ × 6½″ × 8″ Imperial XRB 2-stage duplex	6,250	1,698	
12″ × 10″ × 14″ × 10″ Ingersoll Class FR 1	7,900	1,935	
13″ × 7″ × 10″ Ingersoll Rand	7,800	1,890	
8″ × 12″ × 12″ Ingersoll Rand	8,750	2,844	
17″ × 9½″ × 12″ Ingersoll Rand	13,500	3,335	
10″ × 16″ × 14″ Ingersoll Rand type 10	17,050	4,350	
GAS			
20 hp. turbine driven	3,800	2,156	
50 " " "	6,750	3,135	
9″ × 20″ × 12″ Imperial XI	14,000	3,450	
12″ × 30″ × 18″ Platt duplex	.....	.....	$ 8,000
14″ × 24″ × 18″ " "	.....	.....	7,500
No. 10 Sturtevant with 11″ × 10′ engine	.....	.....	4,470
No. 8 Roots with 20 hp. motor	.....	.....	3,194
Concrete Chutes			
Per lin. ft., in place	.....	.....	1.10
Concrete Mixers			
2 cu. ft. gas engine attached, Little Wonder	.....	.....	220
7 cu. ft. gas engine attached, Koehring	.....	.....	620
10 cu. ft. gas engine attached, Marsh	.....	.....	906
Condensers			
Barometric 32,000 lb. steam per hr., Worthington	26,000	4,600	
Barometric 2,000 kw., Alberger	25,000	3,500	
Surface 2,200 sq. ft.	17,000	4,000	
" 2,900 " "	20,500	5,100	
" 3,600 " "	45,200	13,875	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Condensers (*Continued*)			
Surface 15,000 sq. ft.	128,000	$40,100	
Jet with turbine, Westinghouse No. 5	6,980	4,815	
" " " " " 8	11,450	6,370	
" " " " " 14	13,850	10,150	
Gas condenser 2'9" × 14'9" Vertical Gas Mchy. Co.	4,000	630	
Gas condenser 5'0" × 19'0" Vertical Gas Mchy. Co.	10,000	1,560	
Gas condenser 4'6" × 19'0" Western Gas	.....	.....	$ 1,600
Gas condenser 4'6" × 25'0" Western Gas	.....	.....	2,600
Gas condenser 6'0" × 13'6" Steere	.....	.....	2,250
Cranes			
15 ton locomotive crane, 50' boom, O & S	84,000	9,150	
2½ ton clam bucket locomotive, 75' boom, Brown	151,000	18,000	
1 ton 25' span, travelling, hand operated	.....	.....	375
2 ton 20' span, travelling, hand operated	.....	.....	400
4 ton 25' span, travelling, hand operated	.....	.....	500
5 ton 30' span, travelling, hand operated	4,800	.....	650
6 ton 18' span, travelling, hand operated	4,200	.....	625
12 ton 40' span, travelling, hand operated	15,000	.....	1,450
15 ton 35' span, travelling, hand operated	16,000	.....	1,740
1 ton 20' span, travelling, electric operated	.....	.....	416
3 ton 18' span, travelling, electric operated	.....	.....	1,200
4 ton 18' span, travelling, electric operated	.....	.....	1,700
5 ton 20' span, travelling, electric operated	.....	.....	2,000
10 ton 30' span, travelling, electric operated	.....	.....	2,500

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Creamery Equipment			
BOTTLE FILLER			
4 bottles per min., Davis	.....	.....	$ 75
12 " " " Milwaukee	.....	.....	200
38 " " " "	.....	.....	1,120
BOTTLE WASHER			
3 cases per min., Rice & Adams	.....	.....	905
1,000 bottles per hr., J. W. Ladd	.....	.....	200
960 " " " Blue Line	.....	.....	410
BUTTER WRAPPING MACHINE			
Automatic	.....	.....	1,565
CAN WASHER			
6 can capacity, C. P. Co	.....	.....	500
10 " per min.	.....	.....	1,200
CHURN			
1,000 lb. capacity, wood, Disbrow	.....	.....	725
No. 8 wood, dual	.....	.....	1,060
CREAM SEPARATOR			
No. 22 De Laval	.....	.....	205
ICE CREAM FREEZERS			
10 gal. Miller make	.....	.....	1,900
PASTEURIZER			
No. 6 Jensen	.....	.....	300
500 gal. capacity	.....	.....	370
RIPENER			
600 gal. capacity	.....	.....	970
STERILIZING VAT			
300 gal., cherry	.....	.....	600
VISCOLIZER			
1¼" × 4" with 20 hp. motor	.....	.....	500
Crushers			
No. 2 Keller 12" roll, belted	900	$ 135	
" 496 Sturtevant automatic, belted	900	350	
26" × 24" 2 roll link belt with feeder	11,000	1,650	
30" × 36" Robins	16,000	2,400	
24" × 24" Jeffrey single roll 40 tons per hr.	6,500	1,300	
30" × 30" Jeffrey single roll 40 tons per hr.	10,500	2,300	
Dry Cleaning Equipment			
GAS SEPARATOR			
No. 600 De Laval make	.....	.....	500
" 3 " " "	.....	.....	1,000

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Dry Cleaning Equipment (*Continued*)			
GASOLINE PUMP			
Glover system, twin rotary	.....	.....	$ 1,350
GASOLINE STILL			
30 gal. size	.....	.....	150
Bowser still	.....	.....	1,400
GLOVE WASHER			
12″ × 20″ Sabin make	.....	.....	75
24″ × 20″ " "	.....	.....	150
HAT BLOCKING MACHINE			
Hoffman	.....	.....	250
PRESSES			
AA 25 Hoffman make	.....	.....	75
4A " "	.....	.....	100
5 " "	.....	.....	300
6 " "	.....	.....	350
7 " "	.....	.....	400
AA 1161 " "	.....	.....	450
Model C " "	.....	.....	500
STEAMER			
Meteor for shirts	.....	.....	75
" " sleeves	.....	.....	50
Elevators			
HAND OPERATED			
1 floor lift, 500 lb. capacity, 6′ × 6′	.....	.....	286
1 " " 1,000 " " "	.....	.....	414
1 " " 1,500 " " "	.....	.....	466
1 " " 2,000 " " "	.....	.....	538
1 " " 3,000 " " "	.....	.....	595
Add $75 for each additional floor.			
HYDRAULIC			
12′ lift, 8″ plunger 6′ × 6′ platform	3,000	$ 650	
16′ " 8″ " " "	3,500	756	
20′ " 8″ " " "	4,000	866	
24′ " 8″ " "	4,500	974	
12′ " 10½″ 8′ × 8′ "	4,300	778	
16′ " 10½″ " " "	4,800	922	
20′ " 10½″ " " "	5,400	1,066	
24′ " 10½″ " " "	6,000	1,210	
12′ " 16″ " " "	6,100	1,228	
24′ " 16″ " " "	8,000	1,660	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Elevators (*Continued*)			
MOTOR OPERATED			
1 floor lift 2,000 lb. capacity, Freight, 6′ × 6′	.....	.....	$ 1,800
1 floor lift 3,000 lb. capacity, Freight, 6′ × 6′	.....	.....	2,000
1 floor lift 4,000 lb. capacity, Freight, 6′ × 6′	.....	.....	2,100
Add $100 for each additional floor.			
Engines			
GASOLINE			
1¾ hp. 600 r.p.m. Hercules	280	$ 58	
2½ " 600 " "	305	73	
3½ " 550 " "	540	100	
6 " 500 " "	900	152	
HOISTING, WITH BOILER			
16 hp. double cylinder 125 lb. steam, O & S	6,900	925	
25 hp. double cylinder 125 lb. steam, O & S	9,600	1,205	
35 hp. double cylinder 125 lb. steam, O & S	10,400	1,647	
45 hp. double cylinder 125 lb. steam, O & S	15,300	2,400	
VERTICAL, CENTER CRANK			
4½″ × 5½″ 300 r.p.m. 5 hp. O & S.	550	175	
5¼″ × 7½″ 250 " 7 " "	900	220	
6¼″ × 7½″ 225 " 9 " "	925	242	
7½″ × 7½″ 200 " 11 " "	1,400	320	
HORIZONTAL, CENTER CRANK			
7½″ × 9″ 225 r.p.m. 15 hp. O & S.	1,700	405	
8½″ × 10″ 225 " 20 " "	2,100	475	
9½″ × 10″ 225 " 25 " "	2,800	580	
10″ × 12″ 200 " 30 " "	3,300	670	
11″ × 14″ 180 " 40 " "	4,700	925	
UNA FLOW			
Ames, belted, per i.hp	100	28	
CROSS-COMPOUND, HORIZONTAL			
100 hp. ball governor, slide valve	.....	2,460	3,100
150 " " " " "	.....	3,090	3,900
200 " " " " "	.....	3,730	4,750
250 " " " " "	.....	4,360	5,500

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Engines (*Continued*)			
300 hp. ball governor, slide valve	.....	$ 5,000	$ 6,350
200 " shaft non-releasing Corliss	.....	6,340	8,050
300 " " " " "	.....	7,880	10,000
400 " " " " "	.....	9,460	12,000
500 " " " " "	.....	11,000	13,900
600 " " " " "	.....	12,550	15,900
700 " " " " "	.....	14,150	17,950
TANDEM COMPOUND, HORIZONTAL			
100 hp. flywheel governor & slide valve	.....	2,310	2,980
150 " " " " "	.....	3,020	3,920
200 " " " " "	.....	3,730	4,700
250 " " " " "	.....	4,320	5,600
300 " " " " "	.....	5,140	6,650
350 " " " " "	.....	5,840	7,550
100 " " non-releasing Corliss	.....	3,680	4,750
150 " " " " "	.....	4,480	5,800
200 " " " " "	.....	5,270	6,800
250 " " " " "	.....	5,600	7,250
300 " " " " "	.....	6,880	8,900
350 " " " " "	.....	7,660	9,900
500 " " " " "	.....	11,100	14,300
750 " " " " "	.....	17,800	23,000
SINGLE CYLINDER, CORLISS			
14" × 36" including foundations	25,000	3,150	4,100
14" × 42" " "	27,000	3,340	4,350
16" × 36" " "	30,000	3,600	4,700
16" × 42" " "	31,000	3,700	4,800
18" × 36" " "	34,000	4,000	5,150
18" × 42" " "	38,000	4,350	5,600
18" × 48" " "	40,000	4,750	6,150
20" × 42" " "	43,300	4,850	6,250
20" × 48" " "	45,600	5,250	6,750
22" × 42" " "	48,500	5,550	7,100
22" × 48" " "	54,000	6,100	7,830
24" × 48" " "	65,800	7,400	9,450
26" × 48" " "	76,000	8,600	11,000
28" × 48" " "	84,000	9,550	12,200
28" × 54" " "	86,500	9,800	12,500
30" × 36" " "	90,000	10,000	12,750
30" × 48" " "	98,000	10,600	13,500
30" × 60" " "	126,000	12,900	16,500
32" × 48" " "	142,000	14,500	18,500

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Engines (*Continued*)			
32" × 60" including foundations	180,000	$17,100	$ 21,800
36" × 48" " "			
3–15′ × 42" flywheels	270,000	22,200	26,800
Fans			
CLARAGE S. P. EXHAUSTER			
No. 25, 16" wheel, single fan	265	57	
" 30, 20" " " "	390	70	
" 40, 26" " " "	685	110	
" 50, 33" " " "	1,050	165	
" 60, 40" " " "	1,800	240	
" 80, 53" " " "	3,415	440	
" 100, 66" " " "	6,250	700	
" 120, 80" " " "	8,700	1,040	
" 140, 92" " " "	10,640	1,550	
" 160, 106" " " "	14,000	2,500	
" 25, 16" " double "	535	95	
" 30, 20" " " "	735	115	
" 40, 26" " " "	1,350	200	
" 50, 33" " " "	2,150	280	
" 60, 40" " " "	3,185	405	
" 80, 53" " " "	6,050	730	
" 100, 66" " " "	8,620	1,170	
" 120, 80" " " "	11,300	1,750	
" 140, 92" " " "	13,800	2,600	
" 160, 106" " " "	18,200	4,180	
Furnaces			
ELECTRIC			
1½ ton Heroult type	.....	.....	23,500
GAS & OIL, FIRECLAY, WITH C. I. JACKET			
Length, 43", height 40", width 38"	2,800	325	
" 65", " 40", " 38"	4,100	420	
" 96", " 40", " 38"	5,300	510	
Dimensions are overall.			
Gas Manufacturing Equipment			
Size 15′0" × 26′0" × 9′4" benches each	.....	.....	7,950
Size 16′0" × 28′0" × 10′0" benches each	.....	.....	8,100
Includes hyd. main & stack.			
Coke ovens, I. E. Co. type, per oven	.....	.....	36,000
Blue gas machine, 12′ dia	.....	.....	113,150

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Gas Manufacturing Equipment (*Contd*)			
Coke handling equip. for blue gas	.....	.....	$ 10,400
B.t.u. control	.....	.....	2,000
Cottrell precipitator 500,000 cu. ft. per hr	.....	.....	11,000
No. 9 Roots exhauster with 40 hp. motor	.....	.....	5,100
No. 10 Sturtevant blower with 11″ × 10″ engine	.....	.....	4,900
No. 10 Sturtevant blower with 40 hp. motor	.....	.....	4,300
No. 10 Sturtevant blower d.c. to 200 hp. motor	.....	.....	5,100
3′0″ × 25′0″ condenser	.....	.....	2,100
7′0″ × 27′0″ scrubber	.....	.....	2,600
Washer cooler, Daugherty	.....	.....	14,200
Purifier 40′0″ × 40′0″ × 16′0″	.....	.....	13,500
" 20′0 × 25′0″ × 12′0″ Stacy	.....	.....	12,000
Meter 16″ × 48″ Connersville	.....	.....	2,980
" 28″ × 84″ "	.....	.....	10,000
Ammonia concentrator, 4′0″ × 6′3″ still	.....	.....	9,100
Ammonia concentrator, 4′0″ × 9′0″ still			
Ammonia concentrator, 4′0″ × 19′0″ still			
Water gas machine, carbureted, size 11′0″ Complete with attachments, Gas Machy. Co	.....	.....	35,500
Water gas machine, carbureted, size 8′6″ Complete with attachments	.....	.....	20,500
Gas holder, 100,000 capacity	.....	.....	28,500
Gas holder, 500,000 cu. ft., 3 lift	.....	.....	61,200
Gas holder, 750,000 " " " "	.....	.....	101,500
Scrubber, 6′0″ × 20′0″ secondary (Cost of foundations included.)	.....	.....	2,200
Hydro Electric Plants, Small			
3 kw. Hoppes complete with gov	2,200	$ 915	
5 " " " " " "	2,250	1,000	
Ice Cream Manufacturing Equipment			
BRINE WELL CABINETS			
1, 20 qt. can size	.....	.....	44

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Ice Cream Manufacturing Equipment (*Continued*)			
2, 20 qt. can size	.....	.....	$ 59
3, 20 " " "	.....	.....	72
4, 20 " " "	.....	.....	90
5, 20 " " "	.....	.....	110
ICE BREAKERS, CREASEY			
10¼″ × 16″ opening ¾ hp. motor	1,000	$ 329	
11½″ × 16½″ " 1 " "	1,100	360	
15½″ × 18½″ " 1½ " "	1,500	423	
19½″ × 18½″ " 3 " "	1,700	495	
29½″ × 18½″ " 5 " "	2,500	608	
7″ × 9¼″ hopper size, hand	100	35	
9¼″ × 14½″ " " " "	225	55	
10¼″ × 16″ hopper size, hand 3 tons per hr	450	104	
11½″ × 16½″ hopper size, hand 5 tons per hr	600	113	
13½″ × 16½″ hopper size, hand 8 tons per hr	650	131	
15½″ × 18½″ hopper size, hand 12 tons per hr	925	167	
ICE CREAM CABINETS			
1, 5 gal. can size	.....	.....	25
2, 5 " " "	.....	.....	36
3, 5 " " "	.....	.....	47
4, 5 " " "	.....	.....	61
ICE CREAM FREEZERS			
10 gal. Miller make	.....	.....	1,900
20 qt. gear driven, improved	200	84	
20 " motor " "	430	180	
40 " gear " "	250	125	
40 " motor " "	830	227	
ICE CREAM PACKING TUBS			
20 qt. size, per dozen	.....	.....	50.40
ICE CUBE CUTTERS, BLAKESLEE			
Hand power	325	140	
Belt drive, 12″ × 12″ cakes	450	250	
ICE SHAVERS			
Jack Frost	67	14	
New Rapid	46	18	
Creasey Midget	100	34	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Ice Cream Manufacturing Equipment (*Continued*)			
Creasey motor driven hopper 9¼ × 14½	500	$ 215	
Ice Plant Machinery			
BUTCHER SHOP REFRIGERATION PLANTS			
1 ton machine	.....	.....	$ 1,700
2 " "	.....	.....	2,000
3 " "	.....	.....	2,300
CONDENSERS, AMMONIA			
12 pipes, 19'0" long per stand, plain type	.....	.....	280
12 pipes, 19'0" long per stand, flooded type	.....	.....	345
CONDENSERS, STEAM			
Vaile type, each	.....	.....	335
REFRIGERATING ENGINE			
25 ton duplex cross-compound, Corliss	.....	.....	9,200
50 ton duplex cross-compound, Corliss	.....	.....	11,300
70 ton duplex cross-compound, Corliss	.....	.....	13,600
116 ton duplex cross-compound, Corliss	.....	.....	23,400
Foundations not included.			
REFRIGERATING MACHINE, ELECTRIC			
50 ton ice machine	.....	.....	8,300
90 " " "	.....	.....	13,900
100 " " "	.....	.....	18,500
(Foundations not included.)			
Total Cost of Ice Plants Completely Erected			
ELECTRIC PLANTS			
Complete except bldg., 25 ton	.....	.....	45,000
Complete with bldg., 25 ton 4,800 tons per yr	.....	.....	68,700
Complete except bldg., 40 ton	.....	.....	64,000
Complete with bldg., 40 ton 8,400 tons per yr	.....	.....	98,000
Complete except bldg. 50 ton	.....	.....	68,000

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Total Cost of Ice Plants Completely Erected (*Continued*)			
Complete with bldg. 50 ton 9,000 tons per yr	.....	.....	$102,000
Complete except bldg., 100 ton	.....	.....	105,000
Complete with bldg., 100 ton 16,000 tons per yr	.....	.....	155,000
Complete except bldg., 150 ton	.....	.....	160,000
Complete with bldg., 150 ton 24,000 tons per yr	.....	.....	223,500
Motor driven, raw water.			
STEAM PLANTS			
Complete except bldg., 25 ton	.....	.....	48,000
Complete with bldg., 25 ton 4,800 tons per yr	.....	.....	69,000
Complete except bldg., 40 ton	.....	.....	70,000
Complete with bldg., 40 ton 8,400 tons per yr	.....	.....	98,000
Complete except bldg., 50 ton	.....	.....	62,000
Complete with bldg., 50 ton 9,000 tons per yr	.....	.....	96,000
Complete except bldg., 100 ton	.....	.....	93,000
Complete with bldg., 100 ton 16,000 tons per yr	.....	.....	140,000
Complete except bldg. 150 ton	.....	.....	150,000
Complete with bldg., 150 ton 24,000 tons per yr	.....	.....	205,000
Steam driven, distilled water.			
Jewelry Manufacturing Equipment			
DIAMOND CUTTING MACHINE			
Standard size	.....	.....	100
DRILL PRESS			
4" D. Mour	.....	.....	30
FLAT ROLLS			
4" × 2½" Oliver make	.....	.....	100
POLISHING LATHE			
No. 3 Oliver make	.....	.....	70
" 3 Bowland make	.....	.....	150
WIRE ROLLS			
2" × 2¾" size	.....	.....	85
3½" × 2" "	.....	.....	100
4" × 2½" "	.....	.....	155
5" × 7" size	.....	.....	200

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Laundry Equipment			
DAMPENERS, ALL COPPER			
Collar, belt driven		$ 315	
" motor "		445	
Seam, Metcalf			$ 79
Shirt Conveyor, Geo. H. Bishop			219
DRYROOMS			
Conveyer, wood cabinet, belt driven		1,275	
" motor driven		1,485	
EXTRACTORS			
Extractor		500	
Centrifugal, Bock Co			276
20" motor drive, marathon		705	
20" belt " "	900	375	
24" motor " "		765	
24" belt " "	1,300	435	
26" motor " "		845	
26" belt " "	1,450	500	
28" motor " "		895	
28" belt " "	1,550	535	
30" motor " "		975	
30" belt " "	1,650	580	
Detached countershaft.			
32" size, overbelt driven	3,100	1,150	
40" " " "	5,100	1,625	
48" " " "	6,800	2,100	
54" " " "	10,200	2,900	
Straight countershaft attached.			
32" diameter, overhead			1,200
40" " "			1,600
48" " "			2,100
24" diameter, small			750
26" " "			850
28" " "			900
30" " "			1,000
20" belt drive, starch	1,150	540	
20" motor " "		870	
24" belt " "	1,350	630	
24" motor " "		960	
40" size of basket, Trojan	4,400	2,400	
48" " " " "	6,000	2,750	
IRONERS			
Big Six, flatwork, belt driven		6,720	
" " " motor "		7,200	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Laundry Equipment (*Continued*)			
Big Eight, flatwork, belt driven		$ 8,460	
" " " motor "		9,100	
Chest type, 4 roll			$ 4,000
" " 6 "			6,000
" " 8 "			7,200
Collar edge, Wm. A. Ziedler & Co			336
Concave-convex, belt driven		2,075	
" " motor "		2,375	
Huebsch, handy garment steam inlet ½" single	250	95	
Huebsch, handy garment steam inlet ½" double	550	185	
Hosiery, each		40	
Single return apron, motor driven, 16" cylinder		2,400	
80" single roll, handkerchief			800
100" " " "			900
Perfect sleeve ironer			150
9" sleeve ironer, Amer. Ldry Mch. Co., with motor			473
Sleeve, perfect tandem			319
30" swivel body, gas, Amer. Ldry. Mch. Co			350
100" belt driven, standard 5 roll, flat	9,000	3,220	
100" motor " " " " "	10,000	3,635	
24" belt driven, steam, collar	3,500	1,340	
24" motor " " "		1,605	
30" belt " " "	3,700	1,430	
30" motor " " "		1,695	
40" belt " " "	4,100	1,550	
40" motor " " "		1,815	
50" belt " " "	4,600	1,650	
50" motor " " "		1,915	
No. 0, 66" belt driven, triplex	2,175	770	
" " 66" motor " "		995	
No. 0, 80" belt driven, triplex	2,325	870	
" " 80" motor " "		1,095	
" " 100" belt " "	2,550	1,020	
" " 100" motor " "		1,245	
24" Dia. rolls, 2 roll cylinder type			5,500

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Laundry Equipment (*Continued*)			
30″ Dia. rolls, 2 roll cylinder type	.....	.....	$ 6,500
36″ " " " " " "	.....	.....	8,000
IRONING BOARD			
No. 1, plain	.....	$ 17.50	
MACHINES			
Blanket carding, Lambert	.....	.....	965
Blanket napping, Troy make	.....	1,500	
Hand Marking, 6 character Nat'l	.....	365	
Power Marking, Model 8, motor driven Nat'l	.....	525	
Rose label, Nat'l, Marking Mach. Co.	.....	.....	450
Saw edge, home made	.....	.....	125
The Shaw machine, For collars	.....	67.50	
Starch processing, Amer. Ldry. Mach. Co	.....	.....	1,194
Tape, Singer	.....	.....	150
MANGLE (HANDKERCHIEF)			
66″ Watkins	.....	.....	660
MOLDERS			
Collar, Prosperity	.....	.....	350
" Thrift Roll Collar Molder Co.	.....	.....	105
PRESSES			
Advance, garment, Amer. Ldry. Mach. Co	.....	.....	410
Advance, shirt body, Amer. Ldry. Mach. Co	.....	.....	456
Advance, universal, Amer. Ldry. Mach. Co	.....	.....	350
Bosom, Hagen type	.....	.....	350
" Keystone board	.....	.....	800
Clothes, each	.....	500	
Collar fixing, Hagen	.....	.....	200
Compound body, Amer. Ldry. Mach. Co	.....	.....	424
Ladies cuff & neckband, each	.....	.....	200
Neckband, unit system, #364517-3227, Amer. Ldry. Mach. Co	.....	.....	405
Neckband, single, Manhattan type	.....	200	
Neckband & yoke, each	.....	350	
Prim, Amer. Ldry. Mach. Co	.....	.....	662

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Laundry Equipment (*Continued*)			
Shirt body, Amer. Ldry. Mach. Co.	.....	.....	$ 538
Single cuff, single, type C	.....	$ 200	
" " double, " "	.....	325	
Soft-shirt collar, Amer. Ldry. Mach. Co	.....	.....	212
Troy Prosperity, model L.C.M. 38, foot power	.....	335	
Troy Prosperity, model L.C.M. 38, air or motor power	.....	560	
Yoke, Hagen type	.....	.....	200
PUFFERS			
4-way, each	.....	.....	50
SCALES			
Each	.....	75	
SHAPERS			
Collar, Barnes & Orb	.....	.....	100
SLEEVERS			
9″ reverse swivel, gas heated	.....	.....	200
9″ shoe, Amer. Ldry. Mach. Co	.....	.....	200
STARCH COOKER, HEAT RETAINING			
15 gal	190	130	
25 "	225	150	
50 "	325	170	
75 "	500	225	
ALL COPPER			
STARCHERS			
No. 8 Bishop, collar, belt driven	.....	700	
" " " " motor "	.....	850	
STRETCHERS			
Curtain, each	.....	.....	800
Lockwood curtain stretcher & dryer, each	.....	575	
Blanket, A. Schumacher	.....	.....	370
TABLES			
Three-bowl starch-dipping, each	.....	.....	65
TANKS			
35 gal. 20½″ dia. Troy, soap	25	21	
50 " 20½″ " " "	28	23	
60 " 24″ " " "	32	26	
80 " 30″ " " "	40	28	
90 gal. 30″ dia. Troy, soap	45	32	
100 " 30″ " " "	55	35	
125 " 30″ " " "	65	93	
150 " 30″ " " "	75	97	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Laundry Equipment (*Continued*)			
175 gal. 36″ dia. Troy, soap	105	$ 110	
TIPPERS			
Wing point, Hagen	.....	.....	$ 100
TRAPS			
No. 1, ½″ Troy, steam	.....	17	
" 2, 1″ " "	.....	30	
TRUCKS			
No. 1, 20″ × 30″ depth 25″, metal, Bishop	100	40	
No. 2, 22″ × 34″ depth 25″, metal, Bishop	105	45	
No. 3, 26″ × 36″ depth 25″, metal, Bishop	125	49	
TUBS			
Automatic rough-dry, starch, Bishop, with motor	.....	.....	287
TUMBLERS			
No. 3, 37″ × 56″ end header, belt driven, clothes	1,400	320	
No. 3, 37″ × 56″ end header, motor driven, clothes	.....	645	
No. 3, 48″ × 54″ end header, belt driven, clothes	1,600	360	
No. 3, 48″ × 54″ end header, motor driven, clothes	.....	700	
Size 32″ × 40″, drying	.....	900	
" 42″ × 40″, "	.....	1,400	
" 42″ × 60″, "	.....	2,000	
" 42″ × 90″, "	.....	2,600	
Size 30″ × 42″, belt driven, service drying	2,300	835	
Size 36″ × 60″, Troy Premier, drying	4,000	1,985	
" 42″ × 42″, " " "	5,000	1,960	
" 42″ × 60″, " " "	5,500	2,250	
" 42″ × 90″, " " "	7,500	2,825	
8 compt., 4 door, Ventro, Amer. Ldry. Mach. Co	.....	.....	3,745
UNDERWEAR FORM			
Portage	.....	.....	50
WASHERS			
36″ × 27″, all monel metal	.....	.....	1,500
36″ × 54″, " " "	.....	.....	2,100
42″ × 36″, " " "	.....	.....	2,100

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Laundry Equipment (*Continued*)			
42″ × 40″, all monel metal	.....	.....	$ 2,400
42″ × 72″, " " "	.....	.....	2,600
42″ × 80″, " " "	.....	.....	3,400
42″ × 84″, " " "	.....	.....	3,800
42″ × 100″, " " "	.....	.....	3,900
No. 11, 30″ × 30″, iron-bearing, standard, wood	1,000	$ 195	
No. 11, 30″ × 36″, iron-bearing, standard, wood	1,400	200	
No. 11, 36″ × 36″, iron-bearing, standard, wood	1,750	485	
No. 11, 36″ × 48″, iron-bearing, standard, wood	2,100	515	
No. 11, 36″ × 54″, iron-bearing, standard, wood	2,300	530	
No. 11, 42″ × 36″, iron-bearing, standard, wood	2,100	565	
No. 11, 42″ × 54″, iron-bearing, standard, wood	2,625	700	
Single geared, belt driven. Monel metal cylinder G.I. outside 28″ × 48″, Ossillo	.....	.....	733
Monel metal cylinder G.I. outside 42″ × 74″, Ossillo	.....	.....	1,700
No. 110, 37″ × 54″ belt driven, rapid, wood	2,400	775	
No. 110, 37″ × 62″ belt driven, rapid, wood	2,800	830	
No. 110, 37″ × 70″ belt driven, rapid, wood	3,100	895	
No. 110, 37″ × 84″ belt driven, rapid, wood	3,400	945	
No. 110, 37″ × 94″ belt driven, rapid, wood	3,800	1,040	
No. 110, 44″ × 54″ belt driven, rapid, wood	3,300	925	
No. 110, 44″ × 62″ belt driven, rapid, wood	3,600	975	
No. 110, 44″ × 70″ belt driven, rapid, wood	4,200	1,020	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Laundry Equipment (*Continued*)			
No. 110, 44″ × 84″ belt driven, rapid, wood	4,800	$ 1,110	
No. 110, 44″ × 94″ belt driven, rapid, wood	5,100	1,150	
36″ × 36″ type A motor driven, Troy Premier	2,750	2,100	
36″ × 54″ type A motor driven, Troy Premier	3,400	2,460	
36″ × 62″ type A motor driven, Troy Premier	3,650	2,715	
36″ × 70″ type A motor driven, Troy Premier	3,900	2,880	
36″ × 84″ type A motor driven, Troy Premier	4,150	3,130	
36″ × 94″ type A motor driven, Troy Premier	4,400	3,650	
42″ × 36″ type A motor driven, Troy Premier	3,900	2,310	
42″ × 54″ type A motor driven, Troy Premier	4,150	2,680	
42″ × 62″ type A motor driven, Troy Premier	4,300	2,950	
42″ × 70″ type A motor driven, Troy Premier	4,550	3,120	
42″ × 84″ type A motor driven, Troy Premier	4,900	3,250	
42″ × 94″ type A motor driven, Troy Premier	5,050	3,700	
32″ × 30″ type A belt driven, Turline metal	2,700	1,995	
36″ × 36″ type A belt driven, Turline metal	3,100	2,225	
36″ × 51″ type A belt driven Turline metal	3,500	2,710	
36″ × 62″ type A belt driven, Turline metal	3,800	3,010	
36″ × 70″ type A belt driven, Turline metal	4,000	3,350	
36″ × 84″ type A belt driven, Turline metal	4,300	3,600	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Laundry Equipment (*Continued*)			
36″ × 96″ type A belt driven, Turline metal	4,700	$ 4,275	
42″ × 36″ type A belt driven, Turline metal	4,300	2,790	
42″ × 54″ type A belt driven, Turline metal	4,700	3,270	
42″ × 62″ type A belt driven, Turline metal	5,100	3,585	
42″ × 70″ type A belt driven, Turline metal	5,600	3,515	
42″ × 84″ type A belt driven, Turline metal	6,300	4,100	
42″ × 96″ type A belt driven, Turline metal	7,000	4,640	
34″ × 36″ Amer. Ldry. Mach. Co. belt driven, wood	.....	.....	$ 350
22″ × 24″ Amer. Ldry. Mach. Co. belt driven, wood	.....	.....	210
36″ × 48″ Amer. Ldry. Mach. Co. belt driven, wood	.....	.....	650
30″ × 30″ plain belt drive, wood	.....	.....	250
36″ × 40″ " " " "	.....	.....	400
36″ × 60″ " " " "	.....	.....	540
36″ × 96″ " " " "	.....	.....	700
36″ × 108″ " " " "	.....	.....	760
40″ × 30″ " " " "	.....	.....	430
40″ × 48″ " " " "	.....	.....	475
40″ × 66″ " " " "	.....	.....	640
40″ × 84″ " " " "	.....	.....	700
40″ × 96″ " " " "	.....	.....	740
40″ × 108″ " " " "	.....	.....	800
42″ × 30″ " " " "	.....	.....	490
42″ × 54″ " " " "	.....	.....	500
42″ × 72″ " " " "	.....	.....	700
42″ × 96″ " " " "	.....	.....	800
WHEELS			
Rough-dry assorting, home made	.....	.....	76
Macaroni Manufacturing Equipment			
BINS			
30″ fan 5′ × 12′ × 3′ wooden	.....	.....	250

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Macaroni Manufacturing Equipment (*Continued*)			
GRINDER			
Small, 25 lb. capacity	.....	.....	$ 175
KNEADER			
Walton, 1,000 lb. capacity	.....	.....	2,000
MIXER			
Walton, 1,000 lb. capacity	.....	.....	600
PRESSES			
Cavagnero, 2 cyl. with hyd. pump	.....	.....	2,080
" screw press	.....	.....	1,000
Machine Shop Equipment			
BOLT THREADER			
2" Landis, single head	2,200	$ 900	
3" " " "	4,200	1,800	
No. 732 G. T. D. ¼" to 1"	925	475	
" 734 " " " ¼" to 1½"	1,300	550	
" 736 " " " ½" to 2"	1,625	775	
BORING MILLS			
32" Cincinnati	16,000	4,500	
42" "	20,000	5,700	
48" "	22,000	6,300	
5" "	28,000	7,400	
6" "	41,000	8,500	
7" "	46,000	11,000	
8" "	68,000	13,500	
10" "	80,000	17,000	
12" "	85,000	18,000	
24" vertical Bullard	10,000	4,800	
36" " "	15,620	6,500	
42" " "	21,715	7,900	
44" " "	20,000	6,700	
54" " "	23,800	7,400	
DRILLS			
No. 0 Burke, bench	.....	.....	19
" 1 " "	.....	.....	22
" 2 " "	.....	.....	60
2' American, radial	3,270	1,350	
2½' " "	3,370	1,420	
3' " "	5,000	1,970	
3½' " "	5,300	2,080	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Machine Shop Equipment (*Continued*)			
4' American, radial	5,500	$ 2,150	
5' " "	12,800	3,850	
6' " "	20,000	4,670	
7' " "	21,000	4,970	
6" Barnes, swing	120	40	
8" " "	200	60	
10" " "	225	70	
12" " "	250	80	
16" " "	350	120	
No. 1 Barnes 20" swing	560	145	
" 1½ " 22½" "	1,000	270	
" 2 " 25" "	1,300	325	
" 2½ " 28" "	1,900	575	
" 3 " 34" "	2,600	675	
" 4 " 42" "	4,250	900	
" 8 " 50" "	5,100	1,025	
KEY SEATER			
No. 14 Mitts & Merrill	1,500	290	
18" stroke, Baber Brothers	.....	.....	$ 800
LATHES			
9" × 2½' South Bend New Standard	460	230	
9" × 3' South Bend New Standard	480	235	
9" × 4' South Bend New Standard	520	245	
11" × 3' South Bend New Standard	660	290	
11" × 4' South Bend New Standard	710	300	
11" × 5' South Bend New Standard	790	310	
13" × 4' South Bend New Standard	1,040	340	
13" × 5' South Bend New Standard	1,090	352	
13" × 6' South Bend New Standard	1,140	364	
13" × 8' South Bend New Standard	1,240	388	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Machine Shop Equipment (*Continued*)			
15″ × 5′ South Bend New Standard	1,450	$ 415	
15″ × 6′ South Bend New Standard	1,525	430	
15″ × 7′ South Bend New Standard	1,600	445	
15″ × 8′ South Bend New Standard	1,710	460	
15″ × 10′ South Bend New Standard	1,875	490	
16″ × 6′ South Bend New Standard	1,840	480	
16″ × 7′ South Bend New Standard	1,920	495	
16″ × 8′ South Bend New Standard	2,000	510	
16″ × 10′ South Bend New Standard	2,160	540	
16″ × 12′ South Bend New Standard	2,320	585	
18″ × 6′ South Bend New Standard	2,400	585	
18″ × 7′ South Bend New Standard	2,500	610	
18″ × 8′ South Bend New Standard	2,600	635	
18″ × 10′ South Bend New Standard	2,800	685	
18″ × 12′ South Bend New Standard	3,100	750	
18″ × 14′ South Bend New Standard	3,500	810	
21″ × 7′ South Bend New Standard	3,450	870	
21″ × 8′ South Bend New Standard	3,650	900	
21″ × 10′ South Bend New Standard	3,900	960	
21″ × 12′ South Bend New Standard	4,260	1,035	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Machine Shop Equipment (*Continued*)			
21″ × 14′ South Bend New Standard	4,480	$ 1,095	
24″ × 8′ South Bend New Standard	4,450	1,180	
24″ × 10′ South Bend New Standard	4,700	1,260	
24″ × 12′ South Bend New Standard	5,100	1,360	
24″ × 14′ South Bend New Standard	5,370	1,440	
24″ × 16′ South Bend New Standard	5,650	1,520	
14″ × 6′ American	2,150	1,040	
16″ × 6′ "	2,500	1,260	
Extra 2′ bed for 14″ lathe	200	50	
" 2′ " " 16″ "	250	60	
20″ × 8′ Lodge & Shipley, selective	4,250	2,445	
15″ × 6′ La Blond	2,015	1,232	
7″ × 36″ Dalton, bench	350	162	
8″ × 48″ " "	580	285	
14″ Acme Turret	1,375	720	
16″ " "	2,000	890	
18″ " "	2,400	1,045	
No. 1 " " universal	3,150	2,800	
MILLERS			
No. 1 Cincinnati M type, plain	3,200	1,775	
" 2 " " " "	3,500	1,975	
" 1 " " " vertical	3,300	1,800	
" 2 " " " "	3,450	2,025	
" 1 " " " universal	3,700	2,200	
" 2 " " " "	4,000	2,400	
" 1 " cone " plain	3,000	825	
" 2 " " " "	3,100	1,600	
" 3 " " " "	5,000	2,750	
" 4 " " " "	8,900	4,400	
" 1 " " " universal	3,900	1,750	
" 2 " " " "	4,100	1,925	
" 3 " " " "	5,850	2,550	
" 0 Le Blond, plain	1,620	715	
" 1 " " " heavy duty	2,400	1,150	
" 2 " " " " "	3,295	1,450	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Machine Shop Equipment (*Continued*)			
No. 4 Le Blond, plain heavy duty	7,100	$ 1,990	
" 5 " " " " "	10,285	3,750	
" 1 " " universal cone	2,725	1,490	
" 2 " " " "	4,100	2,235	
" 3 " " " "	5,375	2,350	
" 4 " " " "	6,630	2,440	
" 5 " " " "	8,500	4,280	
PIPE THREADING MACHINE			
4" Williams 1" to 4"	2,350	950	
8" " 2½" to 8"	5,800	1,695	
16" " 7" to 16"	15,550	3,500	
2" Landis pipe cutter & threader			$ 970
4" " " " " "			1,750
6" " " " " "			2,050
8" " " " " "			2,450
12" " " " " "			4,550
18" " " " " "			7,200
20" " " " " "			7,650
PLANERS			
30" × 30" × 8' Cleveland, open side	17,500	3,900	
33" × 33" × 12' " " "	20,000	4,300	
36" × 36" × 8' " " "	24,000	4,600	
42" × 42" × 10' " " "	35,000	5,400	
48" × 48" × 10' " " "	44,000	6,400	
60" × 60" × 12' " " "	67,000	10,000	
72" × 72" × 12' " " "	76,500	13,000	
84" × 84" × 12' " " "	103,000	18,000	
22" × 22" × 5' Cincinnati Tu Speed	4,500	1,675	
24" × 24" × 5' " " "	4,800	1,725	
36" × 36" × 8' " " "	15,000	3,875	
48" × 48" × 10' " " "	32,000	5,775	
84" × 84" × 12' " standard	100,000	16,175	
96" × 96" × 12' " "	110,000	18,850	
PRESSES			
No. 1 Rockford inclinable flywheel	800	210	
" 2 " " "	1,400	325	
" 3 " " "	2,650	450	
" 4 " " "	4,500	725	
" 5 " " "	7,000	1,080	
" 00 Atlas Arbor	20	12	
" 0 " "	65	22	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Machine Shop Equipment (*Continued*)			
No. 1 Atlas Arbor	115	$ 32	
" 2 " "	200	62	
" 3 " "	600	124	
" 4 " "	1,150	198	
SAWS			
No. 2 Marvel quick cut, hack	265	66	
4" × 4"—Atkins Kwik-Kut belt drive, hack	350	140	
6" × 6"—Atkins Kwik-Kut belt drive, hack	400	150	
8" × 8"—Atkins Kwik-Kut belt drive, hack	750	245	
SHAPERS			
14" Smith & Mills	2,200	500	
16" " " "	2,600	750	
20" " " "	3,400	1,080	
24" " " "	4,000	1,120	
25" " " "	4,300	1,250	
16" Gould & Eberhardt	3,880	1,550	
20" " " "	3,880	1,575	
24" " " "	4,100	1,725	
30" " " "	5,600	2,000	
32" " " "	6,200	2,200	
12" Whipp crank	1,350	500	
16" American heavy service	2,875	1,225	
20" Cincinnati back geared	3,425	1,080	

TABLE 184.—EQUIPMENT COSTS.*—(*Continued*)
Motors

ALTERNATING CURRENT

Hp.	Syn. r. p. m.	Fact. cost, motor only	With overload protection, hand starter			With overload & undervoltage prot., remote cont.		
			Factory price		Weight with base & pulley, pounds	Factory price		Weight with base & pulley, pounds
			Without base & pulley	With base & pulley		Without base & pulley	With base & pulley	
½	1,200	$ 34	40	$ 47	100	$ 50	57	100
	900	45	51	58	105	61	68	105
	1,800	34	40	47	100	50	57	100
¾	1,200	41	47	54	105	57	64	105
	900	54	60	67	150	70	77	150
	1,800	39	45	52	105	55	62	105
1	1,200	44	50	57	135	60	67	135
	900	61	67	74	180	77	84	180
	1,800	44	50	57	135	60	67	135
1½	1,200	52	58	65	150	68	75	150
	900	72	78	85	180	88	95	180
	1,800	48	54	61	150	64	71	150
2	1,200	57	63	70	190	73	80	190
	900	80	86	93	205	96	103	205
	1,800	55	63	70	180	71	78	180
3	1,200	69	77	84	205	85	92	205
	900	93	101	112	300	109	120	300
	1,800	68	76	83	205	84	91	205
5	1,200	88	96	107	300	104	115	300
	900	115	123	137	415	131	145	415
	1,800	83	157	168	480	210	221	525
7½	1,200	109	183	197	610	236	250	660
	900	138	212	227	875	265	280	920
	1,800	98	172	186	540	225	239	585
10	1,200	129	203	218	650	256	271	695
	900	160	234	249	780	287	302	825
	1,800	126	200	215	635	253	268	680
15	1,200	164	238	253	780	291	306	825
	900	198	272	287	955	325	340	1,000
	1,800	158	234	249	740	296	311	795
20	1,200	200	276	291	955	338	353	1,010
	900	238	315	332	1,160	377	394	1,215
25	1,800	187	263	278	775	325	340	830
	1,200	231	307	324	1,160	369	386	1,215
	900	274	350	369	1,275	412	431	1,330
	1,800	217	297	312	955	360	375	1,010
30	1,200	263	343	362	1,275	406	425	1,330
	900	308	388	411	1,600	451	474	1,655
	1,800	271	407	424	1,385	586	603	1,710
		271	356	373	1,185	420	437	1,240
40	1,200	313	449	472	1,800	628	651	2,125
		313	398	421	1,600	462	485	1,655
	900	368	504	530	2,085	683	709	2,410
		368	453	479	1,885	517	543	1,940
	1,800	321	462	...	1,360	636	...	1,685
		321	406	...	1,160	470	...	1,215
50	1,200	359	500	526	2,085	674	700	2,410
		359	444	470	1,885	508	534	1,940
	900	430	571	604	2,400	745	778	2,725
		430	515	548	2,200	579	612	2,255
60	900	488	633	674	2,770	808	849	3,100
100	900	702	853	903	3,475	1,022	1,072	3,870
200	900	1,295	1,520	....	5,000	1,800	....	5,400

60 cycle, constant speed, squirrel-cage rotor, horizontal, 220–440 volts, three phase.
For small purchaser discount 10 %.
" large " " 15 ".
* Freight prepaid.

TABLE 184.—EQUIPMENT COSTS.*—(*Continued*)
Motors.—(*Continued*)

DIRECT CURRENT

Hp.	R.p.m.	Fact. cost, motor only	With base, pulley & undervoltage protection				Extra for compound or series winding	Extra for vertical mounting
			Fact. price with hand starter	Weight, pounds	Fact. price with remote control	Weight, pounds		
½	1,750	$ 56	$ 65	105	$ 91	115	$ 2	$ 57
	1,150	64	73	130	99	140	2	57
	850	77	86	190	112	200	2	60
¾	1,750	63	72	125	98	135	2	57
	1,150	72	81	190	107	200	2	60
	850	86	95	220	121	230	2	60
1	1,750	70	79	130	105	140	2	57
	1,150	81	90	190	116	200	2	60
	850	94	103	250	129	260	2	64
1½	1,750	79	93	210	114	200	2	60
	1,150	94	108	270	129	260	2	64
	850	117	131	310	152	300	2	64
2	1,750	89	103	240	124	230	2	60
	1,150	110	124	280	145	270	2	64
	850	170	184	370	205	360	3	70
3	1,750	109	123	290	144	270	2	64
	1,150	166	180	380	201	360	3	70
	850	201	215	480	236	460	4	75
5	1,750	173	190	380	213	360	3	70
	1,150	210	227	480	250	460	4	75
	850	254	271	630	294	610	4	80
7½	1,750	209	226	480	249	460	4	75
	1,150	256	274	630	296	610	4	80
	850	305	323	680	345	670	7	80
10	1,750	240	258	680	295	640	4	80
	1,150	294	327	740	349	700	7	80
	850	351	384	940	406	900	7	85
15	1,750	293	326	740	353	710	7	80
	1,150	360	399	940	420	910	7	85
	850	431	464	1,040	491	1,010	7	85
20	1,750	339	378	940	399	910	7	85
	1,150	420	459	1,040	480	1,010	7	85
	850	509	548	1,410	569	1,380	11	95
25	1,750	381	421	1,040	556	1,080	7	85
	1,150	476	516	1,380	651	1,420	11	95
	850	583	623	1,770	758	1,710	22	370
30	1,750	421	469	1,100	601	1,070	7	85
	1,150	529	577	1,480	709	1,450	11	95
	850	651	699	1,880	731	1,850	28	370
40	1,750	499	557	1,450	689	1,420	11	95
	1,150	633	681	1,740	823	1,720	22	370
	850	777	825	2,440	967	2,420	28	405
50	1,150	733	781	1,480	1,051	1,590	11	95
	850	896	944	1,880	1,216	1,990	28	370
	575	1,158	1,206	2,700	1,478	2,810	28	405
60	1,150	833	995	2,660	1,158	2,540	28	405
	850	1,009	1,171	3,760	1,334	3,640	33	455
75	1,150	973	1,135	2,930	1,303	2,810	28	405
	850	1,164	1,326	3,980	1,494	3,860	33	455
	575	1,495	1,657	4,950	1,825	4,830	61	540
100	1,150	1,197	1,405	3,520	1,637	3,500	33	455
	850	1,410	1,618	4,130	1,850	4,110	33	455
	575	1,800	2,008	5,900	2,240	5,880	61	540
125	1,150	1,446	1,661	3,740	1,891	3,730	33	455
	850	1,646	1,861	5,700	2,091	5,090	61	540
	575	2,079	2,294	7,230	2,524	7,220	61	635
150	850	1,868	1,901	5,900	2,318	5,900	61	560
200	850	2,293	.....	.....	.....	.....	77	099

Constant speed, 230 volts, shunt wound, horizontal.
For small purchaser, discount 10 %.
For large " " 15 ".
* Freight prepaid.

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Motors.—(*Continued*)

SMALL, REPULSE INDUCTION

Hp.	Full load, r. p. m.	Volts	Cycles	Price, bare motor	Weight, pounds
1/6	1,725	110	60	$ 13.34	45
	3,450	110–220	60	17.06	
1/4	1,725	110–220	60	14.88	45
	1,140	110–220	60	21.66	60
1/3	1,725	110–220	60	16.19	50
	3,450	110–220	60	21.88	45
1/2	1,725	110–220	60	22.75	60
	1,140	110–220	60	33.25	82
	3,450	110–220	60	33.25	75
3/4	1,725	110–220	60	28.88	80
	1,160	110–220	60	40.25	158
	3,450	110–220	60	37.63	78
	1,750	110–220	60	36.75	80
1	1,160	110–220	60	51.63	165
	3,450	110	60	46.38	90
1 1/2	1,750	110	60	47.25	140
	3,450	110	60	54.25	91
2	1,750	110	60	56.88	158
	1,750	110	60	74.38	225
3	1,160	110	60	104.13	271
	1,750	110	60	106.75	271
5	1,160	110	60	145.25	380
	1,750	110	60	144.38	380
7 1/2	1,160	110	60	182.88	740
	1,750	110	60	179.38	740
10	1,160	110	60	240.63	804

Prices net.

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Moving Picture Show Equipment			
Simplex model D-107 projector			$ 725.00
M. P. power model-B			1,000.00
Spot light Breukert C-4			71.00
Asbestos screen per sq. ft			1.25
Pipe organ, Robert Morton			7,500.00
Silver screen per sq. ft			0.78
Chairs, imitation leather, each			6.00
Pipe			
1/8" black, standard weight per 100 ft	25	$ 4.35	
1/4" black, standard weight per 100 ft	43	4.32	
3/8" black, standard weight per 100 ft	57	4.32	
1/2" black, standard weight per 100 ft	85	5.70	
3/4" black, standard weight per 100 ft	113	7.25	
1" black, standard weight per 100 ft	168	10.37	
1 1/4" black, standard weight per 100 ft	228	14.03	
1 1/2" black, standard weight per 100 ft	273	16.78	
2" black, standard weight per 100 ft	368	22.57	
2 1/2" black, standard weight per 100 ft	582	35.69	
3" black, standard weight per 100 ft	762	46.67	
3 1/2" black, standard weight per 100 ft	920	58.88	
4" black, standard weight per 100 ft	1,089	69.76	
5" black, standard weight per 100 ft	1,481	94.72	
6" black, standard weight per 100 ft	1,919	122.88	
7" black, standard weight per 100 ft	2,377	159.46	
8" black 25 lb. per 100 ft	2,500	167.50	
9" black, standard weight per 100 ft	3,419	238.05	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Pipe (*Continued*)			
10″ black 32 lb. per 100 ft.	3,200	$ 220.80	
12″ black 45 lb. per 100 ft.	4,500	315.00	
Printing Shop Equipment			
INTERTYPE MACHINES			
Model A	.....	.....	$ 2,750
" C. S. M.	.....	.....	4,600
LINOTYPE MACHINES			
Model 8	5,000	4,250	
" 9	5,000	5,300	
" 14	5,000	4,500	
METAL SAW			
5″ Miller	.....	.....	380
6″ "	.....	.....	450
A-3 Hill Curtis	.....	.....	340
MULTIGRAPH MACHINES			
American, hand power	.....	.....	185
No. 4 American, motor driven	.....	.....	950
PAPER CUTTER			
34″ Diamond	.....	.....	615
32″ Oswego, with motor	.....	.....	800
36″ Saybold	.....	.....	1,288
44″ "	.....	.....	2,400
50″ "	.....	.....	2,600
Chandler Price, automatic	.....	.....	1,525
PAPER FOLDERS			
Model E Cleveland, with motor	.....	.....	1,200
" B " " "	.....	.....	2,450
32″ × 44″ Dexter, with motor	.....	.....	2,000
38″ × 50″ " " "	.....	.....	2,770
PRINTING PRESSES			
No. 00 Miehle	.....	.....	6,550
" 1 "	.....	.....	5,950
" 2 "	.....	.....	5,475
" 3 "	.....	.....	5,050
" 3½ "	.....	.....	4,100
" 4 " 2 roller	.....	.....	3,625
" 4 " 3 "	.....	.....	4,150
" 4 " 4 "	.....	.....	4,725
8″ × 12″ Chandler & Price, plain	.....	.....	290
10″ × 15″ " " " "	.....	.....	420

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Printing Shop Equipment (*Continued*)			
12″ × 18″ Chandler & Price, plain	.....	.....	$ 527
14″ × 22″ " " " "	.....	.....	661
10″ × 15″ " " " Miller feed	.....	.....	1,000
12″ × 18″ Chandler & Price, Miller feed	.....	.....	1,700
No. 1253, Goss 8 column	.....	.....	50,000
" 697, " " "	.....	.....	100,000
No. 487 Saybold embossing	.....	.....	200
" 176 Kansol "	.....	.....	325
" 120 Sheridan "	.....	.....	500
20″ × 24″ Sheredant embossing	.....	.....	4,000
17″ × 22″ Kelley, style B	.....	.....	3,900
No. 2 Kelley automatic	.....	.....	6,600
24″ × 30″ Moss, hand	.....	.....	125
27″ × 36″ Fuchs & Lang, hand	.....	.....	175
32″ × 48″ " " " "	.....	.....	246
PROOF PRESSES			
1 Potter	.....	.....	345
2 "	.....	.....	395
3 "	.....	.....	745
12″ × 18″ Vanderbook	.....	.....	168
17″ × 22″ "	.....	.....	560
No. 0 Poco	.....	.....	125
No. 2 "	.....	.....	250
PUNCHING MACHINES			
Southworth, hand power	.....	.....	35
" foot "	.....	.....	70
Portland, multiple	.....	.....	185
Super " "	.....	.....	240
Monitor foot-power perforators	.....	.....	160
" X heavy "	.....	.....	650
Southworth heavy duty perforator, belt	.....	.....	200
Rosbach *XX* heavy power perforator	.....	.....	550
RULING MACHINES			
38″ Hickok with motor	.....	.....	1,912
48″ " " "	.....	.....	2,285
SAW TRIMMERS			
A-3 Hill Curtis	.....	.....	340
Miller, universal	.....	.....	450

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Printing Shop Equipment (*Continued*)			
SEWING MACHINES			
Smyth sewing machine	.....	.....	$ 1,200
No. 121 Over Sewing Mach. Co.	.....	.....	3,000
" 539 " " " "	.....	.....	3,500
STITCHING MACHINES			
No. 7 Morrison	.....	.....	200
" 1 Latham	.....	.....	360
" 0 Latham	.....	.....	410
National Co. 4 heads	.....	.....	1,600
WIRE STITCHER			
No. 2 Boston	.....	.....	350
" 3 "	.....	.....	360
" 4 "	.....	.....	410
Pumps			
CENTRIFUGAL			
1" I. S. single suction, Goulds No. 3010	30	$ 18.50	
1½" I. S. single suction, Goulds No. 3010	35	22.00	
2" I. S. single suction, Goulds No. 3010	100	35	
3" I. S. single suction, Goulds No. 3010	200	55	
4" I. S. single suction, Goulds No. 3010	375	95	
5" I. S. single suction, Goulds No. 3010	650	160	
6" I. S. single suction, Goulds No. 3010	850	180	
With pulley, 60 ft. head.			
1¼" Dayton Dowd type I. S. double suction C. S.	250	90	
1½" small case type I. S. double suction C. S.	300	90	
1½" large case type I. S. double suction C. S.	500	163	
2" small case type I. S. double suction C. S.	450	120	
2½" small case type I. S. double suction C. S.	500	141	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Pumps (*Continued*)			
3" small case type I. S. double suction C. S.	650	$ 175	
3" large case type I. S. double suction C. S.	890	216	
4" small case type I. S. double suction C. S.	1,125	222	
4" large case, type I. S. double suction	1,350	247	
5" small case, type I. S. double suction	1,750	319	
5" large case, type I. S. double suction	2,050	371	
6" small case, type I. S. double suction	2,000	374	
6" large case, type I. S. double suction	2,500	428	
With bedplate for motor.			
STEAM, DUPLEX PISTON			
2½" × 1½" × 3" 250 lb. union	110	58	
3" × 2" × 3" " " "	125	65	
4½" × 2¾" × 4" " " "	400	102	
5¼" × 3½" × 5" " " "	520	128	
6" × 4" × 6" " " "	700	147	
10" × 6" × 10" " " "	2,000	360	
12" × 7" × 10" " " outside packed, Blake	5,400	1,000	
12" × 7" × 12" 250 lb. outside packed, Dean	6,300	1,400	
12" × 7½" × 15" 250 lb. outside packed, Worthington	8,500	1,500	
12" × 8" × 16" 250 lb. outside packed, Epping-Carpenter	7,250	1,600	
TRIPLEX, SINGLE ACTING			
1¼" × 2" with pulley 150 lb. pressure	115	99	
1¾" × 2½" with pulley 150 lb. pressure	200	112	
2" × 3" with pulley 150 lb. pressure	235	125	
2½" × 4" with pulley 150 lb. pressure	400	143	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Pumps (*Continued*)			
3″ × 4″ with pulley 150 lb. pressure	450	$ 161	
3½″ × 4″ with pulley 150 lb. pressure	725	207	
4″ × 6″ with pulley 150 lb. pressure	1,250	318	
VACUUM			
6″ × 12″ × 12″ Deane-Worthington, rotative	6,000	1,400	
6″ × 14″ × 14″ × 10″ Alberger 2 stage	4,000	1,550	
10″ × 16″ × 18″ Worthington simplex	10,000	2,500	
10″ × 24″ × 18″ Worthington relative type B	16,200	3,400	
12″ × 31″ × 16″ Duplex Ingersoll Rand Imperial type XI	28,500	6,627	
14″ × 16″ × 36″ × 16″ Duplex Ingersoll Rand Imperial type XI	32,000	8,050	
Sawmills			
Dixie Yellow Flyer	2,400	368	
Dixie E sawmills	3,800	660	
Dixie D "	4,900	990	
Shoe Repairing Machinery			
FINISHERS			
Model 66 Landis, without motor or dust collector	1,200	238	
Model 62 Landis, without motor or dust collector	2,025	391	
OUTFITS			
No. 10 Landis with 62, elect., 60 line	.....	.....	$ 625
" 10 " " 66, " " "	.....	.....	786
" 12 " " 62, " " "	.....	.....	748
" 12 " " 66, " " "	.....	.....	901
Without motors or collectors.			
SPACE SAVERS			
Model 0 Landis	435	.....	85
" 05 "	810	.....	195.50

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Shoe Repairing Machinery (*Continued*)			
STITCHERS			
No. 12 shoe stitcher, elect. heat. ⅓ hp. motor	825	$ 552	
No. 1 harness stitcher, gas heat	600	297	
Turbines			
HYDRAULIC			
210 hp. Allis Chalmers 450 r.p.m., 50′ headtype E runner, size 0, governor with headgate, hoist and trash racks	18,000	4,800	
225 hp. Worthington, victor turbine with governor, headgates and hoist.	33,300	7,100	
1,200 hp. Allis Chalmers, 360 r.p.m. type BHE, 50′ head, twin, horiz. type E runner, with headgates, hoist and trash racks	35,000	9,300	
STEAM			
25 hp. Terry type E 170 lb. 3,000 r.p.m.	1,050	610	
37½ hp. Terry type E 175 lb. 3,000 r.p.m.	1,200	750	
185 hp. Terry 200 lb. 2,400 r.p.m.	4,000	1,530	
222 " " 200 " 3,760 "	2,100	1,350	
330 " " 175 " 1,200 "	5,100	2,450	
400 " " 175 " 900 "	5,600	3,120	
60 hp. Kerr 2,250 r.p.m. 185 lb. 100° Supheat	1,700	840	
85 hp. Kerr 2,700 r.p.m. 185 lb. 100° Supheat	1,700	950	
155 hp. Kerr 3,600 r.p.m. 185 lb. 100° Supheat	2,800	1,410	
Woodworking Machinery			
BORER			
Crescent universal	1,000	300	
JOINTER			
8″ Famous	950	250	
12″ "	1,450	300	
16″ "	1,700	335	
20″ "	1,875	365	
24″ "	2,000	500	
6″ bench with ½ hp. motor	1,600	170	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Woodworking Machinery (*Continued*)			
MOLDERS			
9″ Woods	.....	.....	$ 1,150
10″ “	.....	.....	1,300
13″ “	.....	.....	1,700
16″ “	.....	.....	2,600
MORTISERS			
Crescent, belt driven	800	$ 390	
“ built in motor	800	480	
H. B. Smith, chisel	.....	.....	250
Hollow	.....	.....	400
New Britton, chain	.....	.....	600
PLANERS			
30″ Woods single head	3,000	1,400	
30″ “ four “	5,000	2,000	
SANDERS			
American Post	.....	.....	100
Fay & Co., 3 drum	.....	.....	2,500
30″ Smith	9,000	3,195	
SAW TABLES			
12″ Crescent	750	100	
No. 2 “ combination	975	265	
Tilting Arbor type J. Tannewitz	1,800	600	
Smith, 335-A rip saw	2,220	620	
No. 16 Variety	1,200	475	
SAWS			
26″ Crescent, band	650	200	
32″ “ “	950	240	
36″ “ “	1,200	296	
48″ “ “	1,475	320	
Crescent, belt driven, swing cut off	450	100	
“ motor “ “ “	500	135	
SHAPERS			
Single spindle, Crescent	1,000	320	
Double “ “	1,320	480	
20″ American	.....	.....	510
SURFACERS AND PLANERS			
14″ × 8″ Famous	1,300	300	
18″ × 8″ “	1,400	348	
24″ × 8″ “	1,500	410	
26″ × 8″ “	2,675	680	
30″ × 7″ “	3,600	1,450	
36″ × 7″ “	4,300	1,750	

TABLE 184.—EQUIPMENT COSTS.—(*Continued*)

Description	Weight, pounds	Factory price	Price, erected
Woodworking Machinery (*Continued*)			
24″ × 6″ Famous with motor	2,600	$ 925	
26″ × 6″ “ “ “	2,800	1,025	
TENONERS			
Single end, Famous	1,800	650	
Double “ “	3,000	1,100	
Crescent, built-in motor	2,500	1,050	
WOOD LATHES			
No. 100 G. T. D. 11″ swing	420	125	
“ 211 G. T. D. 12″ “ without motor	575	200	
No. 483-B. Smith Vocational 12″ swing	700	370	
16″ × 120″ American, belt drive	.....	.....	$ 150
WOODWORKERS			
No. 30 junior	2,700	720	
“ 31 universal	3,550	812	

CHAPTER XXIV

THE APPRAISAL OF MERCHANDISE, FIXTURES, EQUIPMENT, FURNITURE, HOUSEHOLD GOODS, LIVESTOCK

THE APPRAISAL OF MERCHANDISE

One of the difficulties that faces the appraiser of merchandise in his efforts to secure equalization among the different owners is that identical merchandise will represent different values under different conditions. For instance, the manufacturer buys his material, employs his labor, pays his overhead expenses, and the sum total of these expenditures represents the value of the finished product to him. In turn, the wholesaler buys these finished products from the manufacturer, pays the manufacturer's profit, transportation and other costs, and the sum total of his expenditures represents the value to him of the same goods, which value will be higher than it was when the goods were in the hands of the manufacturer.

The next step in the distribution of these goods is taken when the retailer buys them from the wholesaler and pays the wholesaler his selling price which includes his profit, and, in addition to that, the retailer must pay the transportation and other costs to put the goods on his shelves ready for sale to the consumer.

The final step in the process is taken when the customer buys the goods from the retail merchant, including the merchant's profit. Hence, it is evident that the same goods have four different values depending upon the person in whose hands they happen to be. If an assessor places these several values on similar goods, he will manifestly be within the definition of full cash value as laid down by the courts, *viz.*, "what a willing seller will take, not being compelled to sell, and a willing buyer will pay, not being compelled to buy."

Difficulty in Securing Inventories.—In the case of larger merchants, information as to inventories at reasonably frequent intervals is usually easy to obtain. With smaller merchants the information is not always obtainable. Most merchants, however,

take some sort of inventory once a year in order to determine their profits. Too frequently these informal inventories are destroyed after they have served their purpose. If this has not been the case and the original sheets are available, a few tests covering the more important items, by which they are checked as to prices, extensions and footings, and a scanning of all the inventory sheets will usually enable the appraiser to judge as to the dependability of the inventory.

Arriving at Average Inventories.—Most business houses take inventories once a year. The larger ones and some of the smaller ones, handling special lines of merchandise, take inventories semiannually, quarterly or possibly more frequently. Of course, the more often an inventory is taken the easier it is to arrive at an average. The matter of arriving at average inventories is of interest in those states assessing upon the average inventory of a yearly period ending on a date set by law. Frequently, this date does not correspond with the fiscal period of the merchant, which makes it more difficult to secure a present-day inventory figure. If the stock of goods under consideration is more or less standard and if there is little fluctuation, an inventory taken at any time during the year may be accepted as representative of the average for the year. Furniture and hardware stocks are representative of this class of merchandise. The inventory of business houses handling seasonal goods is more difficult to determine. For instance, a store carrying radios experiences the heaviest radio sale at the Christmas season. Men and women's ready-to-wear stores are other good examples of seasonal fluctuation of stocks. Clearance sales are held annually or semiannually in order to dispose of the old stock. Inventories in these cases are taken following the sale. These inventories would not be representative of the average of the year, because the stock at that time is somewhat depleted. New goods are immediately purchased for stock and offered for sale.

In some cases allowance must be made for periods during the year when the stock will be different from that at inventory time. In such cases where there is no retail inventory system, or perpetual system, it is necessary to take into account the purchases and sales of seasonal goods during the year. This can be done by the use of the gross profit method explained in a subsequent section of this chapter.

Retail System.—Many department stores and other large dealers keep what is termed the "retail system" of inventory. This system is started with an actual physical inventory of merchandise at selling price, to which is added, from time to time, the selling price of merchandise when purchased. The gross profit which the merchant expects to make when the goods are sold is thus added to cost. Sales are deducted at selling price. The addition of the gross profit to the cost of the goods is called "mark-up."

If goods become shopworn or if for any reason they must be sold for less than the original price set, a certain percentage is taken off the selling price. This process is called "mark-down." A combination of the "mark-ups" and "mark-downs" is called the "mark-on."

To determine the cost or market inventory by the retail system at any time, the retail inventory is divided by one, plus the original "mark up." For example, if the retail inventory of a stock of goods showed $84,000 and the original "mark-up" was 40 per cent, the cost inventory would be $60,000 ($84,000 ÷ 1.40).

It will be observed that this method results in a writing down below cost of all articles, the original selling price of which has been reduced. For example, an article costing $1 and marked up for sale at $1.50 and later marked down to $1.20 would be inventoried on a cost basis at 80 cents. The "mark-up" being 33⅓ per cent of the selling price, 66⅔ per cent of the final retail inventory price of $1.20 would be the price at which it would be inventoried on a cost basis.

An inventory at any time during the year may be obtained through the retail system, thus making an average inventory easy to calculate. Due allowance, however, should be made for shrinkages that are not revealed until the physical inventory is taken. Any store operating a system of this kind will find that when they take a physical inventory it will be considerably lower than the book inventory. Many things may contribute to this, errors of calculation, stolen or spoiled goods, etc. Further "mark-downs" are usually made at the time the physical inventory is taken.

It is probably fair to allow such merchants an extra discount equal to the average of their "mark-downs" during the year; that is, if it is found that a merchant's average "mark-downs" are

7 per cent, this percentage should be taken off the inventory determined on a cost basis as described above.

Gross Profit Method.—Where no inventory at all has been taken, a close approximation of the amount of goods carried in stock may be determined if the average percentage of gross profits is known. This is called the "gross profit" method of inventory determination. The difficulty of this method is to obtain a starting point. If the concern has commenced business recently, the inventory may be determined by deducting the gross profit from the sales and then deducting this result from the total purchases. For example, if it is found that a merchant has bought $400,000 worth of merchandise which he has sold at an average gross profit of 25 per cent and that his sales have been $250,000, he would have sold goods that cost him $200,000. Therefore, his inventory would be $200,000, the difference between his total purchases and the $200,000 of goods he sold.

Relation of Turnover to Inventory.—When a merchant has not started in business recently and no inventories of any sort can be obtained, a close approximation of the average inventory can be determined if the average gross profit is known and also the average rate of turnover.

The merchant can usually state what his average gross profit is, but he seldom will be able to tell what the rate of turnover is. Every assessor should, through interviews and questionnaires, determine what the rate of turnover is in the various lines of business within his jurisdiction. This information may frequently be determined from sources outside his territory, but care must be taken to see that the conditions, under which the businesses investigated are operating, are similar to those whose inventory the assessor is trying to determine. For instance, the rate of turnover of a druggist running a store on a busy corner in the business section of the city may be quite different from the turnover of the corner druggist in a residence section. Also, one merchant may carry twice the amount of goods carried by another merchant, yet both may have the same total volume of sales.

If the rate of turnover of several different merchants in the same line is obtained, a normal average turnover may be determined by which the business of the merchant in that line of business may be measured. Whenever the measure is applied to an individual concern, due allowance must be made for points

in which that particular taxpayer does not conform to the average in his line of business.

Turnover is the number of times the average inventory of a merchant is contained in the cost of the goods sold during the period of one year. In other words, it is the number of times his stock will be sold, replaced and sold again. If the gross profit and the rate of turnover are both known, the average inventory may be determined by deducting the estimated gross profit from the sales and dividing by the turnover. For example, if the sales were found to be $250,000 per year and the gross profit based on cost is 25 per cent, the amount of gross profit would be 20 per cent of the sales, or $50,000. Then the cost of the goods sold would be $250,000 − $50,000 = $200,000.

Assuming the rate of turnover to be 5, ⅕ of $200,000 or $40,000 would be the average inventory.

Perpetual Inventories.—"Perpetual inventories," "book inventories" and "running inventories" are terms usually applied to a system in which a record is kept of all purchases and all sales. This record is sometimes kept by quantities only, while sometimes it carries the purchases and sales at cost price. Wherever a record of this kind is kept, an inventory may be determined at any period, which will be found to show some shrinkage when a physical inventory is taken. In determining the actual inventory at any date between physical inventory dates, the shrinkage factor should be taken into account. The importance of the shrinkage factor, of course, will increase gradually from the time the last inventory was taken. The average shrinkage may be determined in most cases, therefore by taking the percentage equal to half the difference found when the physical inventory is taken.

Relation of Cash Discount to Inventory.—There is a lack of uniformity in the method of handling cash discounts on purchases. Some merchants treat them as reductions of cost, *i.e.*, they consider that the goods cost them the invoice price less the cash discount. Other merchants treat them as financial earnings, charging their purchases with the invoice price of the goods and crediting the saving to an earnings account called "cash discount."

There may be some difference of opinion as to which price should be used, but a good rule for the assessor to use is to resolve all doubtful points in favor of the taxpayer. Applying this rule,

the fair thing to do is to consider the cash price paid by the merchant for his goods.

If this method is followed, a matter of adjustment comes up with every merchant who treats cash discounts as a financial earning. In these cases the actual average cash discounts for a year should be divided by the total purchases of the year to determine the average rate of cash discount, and this percentage should be deducted from the inventory of the merchant.

When this is done, consideration must also be given to the deduction of debts from intangible assets, which is permitted in some states. Where debts are claimed as a deduction, cash discounts should be deducted from accounts payable before the accounts payable are accepted as proper deduction.

The Manufacturer.—It was stated in the first part of this chapter that the cost to the manufacturer represented the inventory value of the finished goods in the possession of the manufacturer. The question which immediately arises is, "What represents cost to the manufacturer?" The materials which go into a product and the labor incident to changing that material into the form of finished products constitute what is known as the "prime cost." To this must be added what is generally termed "overhead," before the total cost of the product can be determined.

Overhead includes all expenses incident to manufacturing an article that are not included under materials and direct labor. These expenses include such items as heat, light, power, rent, general management, etc., and this portion of expenses may be considered a percentage of the total cost. Sometimes a part of the overhead, as described above, is termed "direct expenses," under which heading are grouped items that may be directly chargeable to a given output, such as power used for certain machines that handle definite parts of the process. This group of expenses is differentiated from other overhead expenses, such as general management which is a cost that is applicable to all kinds of articles manufactured and all phases of manufacturing and cannot, therefore, be allocated to definite units of output.

Another important item of cost is depreciation of equipment and plant. In the days before the federal income tax, comparatively few manufacturers treated depreciation as a cost of manufacture. After the enactment of the income tax law, the incentive for treating depreciation as an expense became so great that many manufacturers were tempted to take a high rate of depreciation.

In checking the inventory of manufacturers, the rate of depreciation should be noted to see that it is fair both to the manufacturer and to the government. If a too high rate of depreciation has been charged as an item of cost, the inventory will be inflated by that amount and will, therefore, be unfair to the taxpayer. On the other hand, if a too low rate of depreciation has been used, the inventory will be understated and will, therefore, be unfair to the government.

From the foregoing it will be seen that it will be easy to determine the average inventory of a manufacturer who keeps a good set of cost records, but, where cost records are not kept, it may be necessary to use the gross profit method described above.

The federal government has established the rule that inventories should be taken at cost or market, whichever is lower. The same rule should be followed by the assessor. If it is determined that the price the manufacturer can get for his product is less than it has cost him to manufacture the product, the market price should be taken for purpose of inventory.

It is contended by some cost accountants that interest should be considered as part of the cost of manufacture. Other authorities hold that such procedure is wrong in principle. Without going into the arguments pro and con, it is sufficient to state that the weight of authority decrees that interest is not a proper item of cost, and, since only a small percentage of the manufacturers treat it as such, the assessor should eliminate it in determining inventories. If a taxpayer is found who does consider it as an item of cost, his inventory should be reduced by the amount that has been charged to manufacturing.

The larger manufacturing plants have a storeroom where stock is kept in charge of a storekeeper. This storage cost, including the storekeeper's salary, rent, insurance, etc., is an item of cost that is not uniformly handled. Some manufacturers add it to the purchase price of their materials, while others treat it as an overhead expense not chargeable to the cost of manufacture. There are arguments in favor of both methods of handling this item, but the important thing, which is always the point with the assessor, is to be uniform in the treatment of the item among taxpayers. Here, again, it is best to resolve the question in favor of the taxpayer and eliminate it from the cost of manufacture.

The same question comes up in relation to the storage cost of finished goods. Again it is more conservative and perhaps advisable to treat such expense as general overhead instead of charging storage cost as an addition to the original cost of the finished product.

Merchandise in the hands of the manufacturer is subject to depreciation, and full allowance should be made for such losses. The burden of proof as to the extent of such loss must be on the taxpayer, but if he can show that his merchandise is of less value than when first manufactured, through natural deterioration or accident, an allowance should be granted. If it is found that the product still can be sold for more than it cost to manufacture, at a price less than the normal selling price, the manufacturer should not be denied the depreciation. This is true because the selling price of his product must cover not only the cost of manufacture but also the cost to sell as well; and if, because of depreciation, he is forced to sell for less than the normal price, it will reduce or entirely eliminate his final net profit so that he will actually realize out of the sale a smaller amount than he has put into its manufacture.

Manufacturers of standard but slow-moving products sometimes find themselves burdened with stocks of articles that must be carried for several years. For instance, if a foundry were to turn out a large quantity of standard castings and then, through some change in the anticipated demand, find itself burdened with a large stock which it must carry for several years, some consideration should be given to this situation. The interest on the money invested in this part of the stock may amount to considerably more than the gross profit when the castings are finally sold. This being the case, the fairest method for inventory is to consider the castings' value equal to the present selling price. In other words, the interest for the period during which the manufacturer must carry it in stock should be deducted from the probable selling price and the difference taken as the value to be assessed.

The Wholesaler.—The basis for the taxation of the goods of the wholesale merchant should be the cost of his goods. Consideration must therefore be given to the items entering into his cost. The first item, of course, is the original invoice price of the goods which the wholesaler buys from the manufacturer. To this must be added transportation costs, including freight or

express, drayage and handling, up to the time the goods are placed in his warehouse. If insurance is carried on the goods in transit, this cost must be added to the cost of the merchandise. In other words, all costs up to the time the goods are in the wholesaler's possession, ready for sale, constitute the cost of the goods to him.

As in the case of the manufacturer, the wholesaler must be given the advantage of reductions in market price. The rule is that cost or market, whichever is lower, should govern.

Items of storage and depreciation of stock are treated similar to those in the case of the manufacturer. Storage cost should probably be eliminated as an item of inventory cost, and depreciation of stock should be allowed. Depreciation should be proved by the wholesaler in all cases.

The Retailer.—The situation of the retailer is much the same as that of the wholesaler. The cost to him is the invoice price plus all transportation, insurance and other expenses incident to putting the goods on his shelves ready for sale. Depreciation is an important factor with a retail merchant, especially if he handles seasonal goods.

In fairness to the taxpayer, the assessor should maintain an open mind in cases where the merchant or the manufacturer claims that his inventory is not as large as shown on his books. This will be especially true where the retailer is in financial difficulties. When he finds himself in this situation, he is prone to inflate his inventory for credit purposes. A large merchant was recently heard to say that if his bank had known his real financial condition two years ago, he would have been taken over by his creditors. Another incident is known where a retail clothing merchant carried his stock on his books at cost prices, even though some men's suits, shoes and other style goods were included that had been bought eight and ten years before, when prices were much higher than at the present time. Here a depreciation had taken place on account of change in style and market fluctuations.

Packing Houses.—Packing houses may be considered as being in a class by themselves, because of their rapid turnover. While a large volume of business is done by the packing houses, their stock will be turned over on an average of about every five days. Thus, it will be seen that the rate of turnover as compared with other lines of manufacture, or with merchants, is much

greater. This enables the packer to sell on a much smaller margin of gross profit than in other lines of trade. Since the turnover is completed on an average of every five days, five days' sales less the average gross profit of the packer would represent the average inventory.

Dairies.—Dairies provide a problem for the assessor, inasmuch as their business is conducted on a daily turnover basis. Their stock on hand is practically nil, although they may be doing a very large volume of business. Especially is this true where the dairy buys its milk from the small producers and does not maintain its own dairy herds. The equipment of the dairy which consists of delivery wagons, containers, dairy machinery, etc., is hardly sufficient as a basis for taxation, if the dairyman would be put on the same basis as dealers in other lines. This is a fault of the general property tax system, but, in those states which are so unfortunate as still to depend chiefly on the general property tax for its revenues, the problem must be met. In some taxing districts an arbitrary rule has been established whereby dairymen are taxed on an amount equal to one-twelfth of their annual sales in addition to the tax on physical assets. While this plan is admittedly arbitrary, it undoubtedly has the effect of more nearly equalizing the tax of the dairymen with the tax paid by other lines of business.

Greenhouses.—The problem of equalizing the assessed valuation of greenhouse stock or merchandise presents a situation made doubly difficult through the inability of the owners and growers to give accurate information concerning the true worth of their products, inasmuch as seasons and circumstances will be found to alter the productiveness of the crop and market prices. Since this condition exists and popular demand for new varieties of flowers forces the grower to change his stock at heavy expense, the use of an *average* value which can be applied for a succession of years, for assessment purposes, becomes imperative. The figures presented herewith are the results of a study made of 50 greenhouses in the city of Denver.

A unit of 100 sq. ft., hereinafter designated as a square or □, is generally used as the measure to be applied to "bench space." Bench space will be found to be approximately ⅔ of the total square feet contained within the four walls of the greenhouse; therefore a building 30 by 100 ft. (outside dimensions) would equal 3,000 sq. ft. less ⅓, or 2,000 sq. ft. of bench, or 20 squares.

More than 0.5 square is considered as one square and less than 0.5 square is discarded.

A viewpoint sometimes taken by a greenhouse owner is that greenhouse stock should not be treated as merchandise but as a growing crop, and, therefore, under the laws of many states, the stock would be non-assessable. It would seem, however, that in exempting growing crops legislators have had in mind field crops, such as corn, grain or other crops raised from seed, grown without protection and left to the mercy of the elements and normal season growth. A greenhouse crop receives all the attention and care that a manufactured product would receive. Seedlings, slips and cuttings are often transplanted several times, all crops are protected from the elements, temperatures are kept at a level most conducive to the growth of the particular plants, and fertilization, irrigation, sun's rays and ventilation are all systematically regulated by artificial means. The stripping, trimming, pruning and cutting of each plant or flower is as important to the market demand as is the precision and accuracy required in the measurement and design of any manufactured article offered for sale. Greenhouse plants are produced by a forced growth, intensely cultivated out of season and protected from destructive elements by many ingenious methods and devices.

Measurements were taken of the spacing of plants of all popular varieties contained within a square, and, where different arrangements were used and the stock was the same, averages were struck on both the number of plants and the estimated value, individually and collectively. Each variety of flower is raised in a more or less different manner and a general outline of this will call attention to items of expense that would otherwise be overlooked.

Carnations.—Carnation "slips" or "cuttings" taken from the woods or mature plants are placed in clean, washed sand of fine quality, kept at an even temperature and very moist. Until these slips take root they have no value. When they become rooted, they are transplanted to 2-in. pots of fertilized earth and acquire a value of $25 to $100 per thousand plants, the average according to popularity being about $40 per thousand, or 4¢ each. This value is maintained for some time; therefore, calculations can be made on young stock as shown in Table 185.

TABLE 185.—VALUE OF CARNATION PLANTS, SLIPS AND CUTTINGS

Size of pots, inches	Number plants per square	Value per plant, cents	Value per square
2	3,600	4	$144
3	1,600	4	64
4	900	4	36

The above figures might be averaged, but the slips in any stage of growth do not constitute more than a small percentage of the grower's stock. For a conservative figure the last amount, $36, will be used. The growing or producing carnations have to be figured in a more detailed manner, as shown in Table 186.

TABLE 186.—CARNATION PLANT SPACING

Spacing	Number plants per square
7″ × 9″	221
6″ × 10″	225
8″ × 10″	180

A fair average is found to be 209 producing plants per square. Investigation shows that the average number of blooms from producing plants is 10 per annum. Then 209 plants × 10 blooms (average) = 2,090 blooms per square per annum which, at 4¢ each, would amount to $83.60 per square per annum.

The producing and non-producing plant values must be balanced, since the basis of value space is used in a large measure for propagation purposes. As a matter of fact, the averaging of these two items is a difficult one and should not be absolutely relied upon, but it probably will be in the grower's favor.

Applying the average method, we have:

900 young plants per square at 4¢ = $36.00
209 mature " " " " 40¢ = 83.60
Total..... $119.60

$\frac{\$119.60}{2}$ = $59.80 which is the average value per square of carnations.

Roses.—The method of propagating roses is similar to that of carnations. Table 187 gives data on roses.

TABLE 187.—VALUE OF ROSE PLANTS, NON-PRODUCING

Description	Plants per square	Price per plant, cents	Value per square
Single 3″ pots	1,600	10	$160.00
" 4″ "	900	10	90.00
Spaced 12″ × 16″	88	10	8.80

Since the spacing of 12 by 16 in. when used for slips is the permanent arrangement of the plants, in which position they are often left from 2 to 4 years, the average figure for non-productive plants is $90 per square. The producing rose plants then are found to be spaced as shown in Table 188.

TABLE 188.—PRODUCING ROSE PLANT SPACING

Spacing	Number plants per square
12″ × 18″	75
12″ × 16″	88
12″ × 12″	100

The average of productive plants is 88 plants per square. The plants average production is 10 blooms, for market, at 8¢ each per plant per annum; then

900 plants per square at 10¢ = $ 90.00
88 " " " " 80¢ = 70.40

Total $160.40

$\frac{\$160.40}{2}$ = $80.20 average per square.

Potted Plants.—Data on bedding stock and all mixed varieties of potted plants is given in Table 189.

TABLE 189.—MIXED VARIETIES POTTED PLANTS

Spacing	Plants per square	Price per plant, cents	Value per square
Seedlings in 18″ square flats spaced 1″ apart	324	½	$ 1.60
Slips in 2″ pots	3,600	2	72.00
Slips in 4″ pots	900	6	54.00

These are comparable with the non-producing plants of other varieties. The marketable bedding stock averages about 400 plants to each square at about 20¢ per plant, or $80 per square. Therefore an average of these figures would be

900 plants per square at 6¢ = $ 54
400 " " " " 20¢ = 80

Total $134

$\frac{\$134.00}{2}$ = $67.00 average per square.

Vegetables.—One crop per year of tomatoes will produce 36 plants per square and about 10 lbs. of marketable produce from each plant, which, at an average of 10¢ per lb., will make $28.80 per square. This figure is used, although some growers get two crops per annum, doubling the value and making it more comparable with flower producers. Others attempt to produce only one crop and turn to cut flowers, such as sweet peas, etc., during the remaining half year. Others grow the latter exclusively, or mix them with rare orchids, ferns and plants that will bring a high market price, but for which there is little demand. The estimates for these are the same as bedding stock, and the summary appears thus:

Carnations,	average	per	square	$59.80
Roses	"	"	"	80.20
Bedding stock	"	"	"	67.00
Cut flowers	"	"	"	67.00
Vegetables	"	"	"	28.00
Average				60.40

This represents an average value per square for the average greenhouse producing a variety of stock. This figure, however, does not take into consideration anything but the probable value of the stock when sold as merchandise. No attempt is made to determine cost, which will be represented by the selling price less the profit made by the grower.

In order to illustrate an assessment based on the foregoing data, and in the absence of accurate cost or net profit data that may be considered a fair average, let it be assumed that 25 per cent is a normal profit. Deducting 25 per cent or $15 from the average figure of $60.40, we have $45, approximately, representing the cost per square for the finished product of the greenhouse.

Merchandise is usually assessed on the basis of an *average* inventory; so the $45 does not represent the assessable value. It is difficult to determine what the average is, but, considering the fact that a crop is gradually produced throughout the year, starting with a value of nil and culminating with the value of the marketable products, one-half the final value will not be far from the fair average value. Using the foregoing figures, the average value would be one-half of $45 or $22.50 per square for assessment purposes.

Brokers and Manufacturers' Agents.—Brokers and manufacturers' agents are in much the same situation as dairymen, except that the unfairness of the ad valorem tax is more pronounced. This type of merchant does not carry stocks of merchandise in the locality where he does his business and keeps his office. If he does keep any stock, it is incidental and not at all in proportion to the volume of his business. As a result of this condition, he is assessed on his office furniture and perhaps a few samples, while his competitor, whose volume of business may be less and who is dealing in his own goods and carrying a substantial stock of merchandise, will be paying a heavy tax many times the amount of the tax paid by the brokers and manufacturers' agent.

This is more a problem for the legislature than for the assessor, yet no assessor can feel that he is doing all he can to equalize taxes without attempting, so far as possible, to remedy this situation. Many assessors have used arbitrary means in an attempt to right the situation, some using the method suggested in the case of dairies, *viz.*, assessing on an amount equal to one-twelfth of the annual sales.

In the absence of a specific law authorizing such procedure, taxation on such a basis cannot be maintained without the consent of the taxpayer, but usually the taxpayer will agree to such procedure if he is a good citizen, and sometimes he will agree even if he is not prompted by altruistic motives. He may realize that to take advantage of the situation and endeavor entirely to avoid taxation may bring upon him some drastic legislation that will make his taxes still heavier.

STORE AND OFFICE EQUIPMENT

Appraisal data on equipment must necessarily be based on average conditions, as the classes of construction are so varied

that it would be impossible to cover every condition the appraiser will meet. The prices quoted and the probable life estimates are for average construction. Variations from the normal conditions must be recognized by the appraiser, and his experience and judgment relied upon for proper modifications and adjustments.

Woods Used in Fixture Construction.—The woods used in fixture construction should be considered first, being chiefly mahogany, walnut, oak and birch. In the manufacture of store fixtures a wider variety of woods is used, including mahogany, walnut, oak, birch, gum, fir and pine. Maple is used very little in the manufacture of fixtures except in sectional meat blocks and bakery table tops. Refrigerators are made of oak, ash or pine.

All hardwoods except maple and birch are open or porous grained and require a filler before they can be properly finished. This filler in hardwood resembles small elongated checks similar to small pencil dashes and are darker than the rest of the finished wood except when the finish is natural.

Floor and counter cases are built of mahogany, walnut, birch, oak and gumwood. Jewelry store fixtures are usually mahogany, birch or walnut. These woods readily absorb stain in the finishing process and when finished harmonize well with their surroundings. It is for this reason that the hardwoods mentioned in the foregoing paragraphs are so largely used, their richness of color, durability and harmonizing effects in the display of merchandise being the deciding factors in determining their respective advantages.

Fixture Cost Data.—In Tables 190 and 191 a considerable range is given in the prices quoted. These apply only to average fixtures and should not be taken as positive quotations under all conditions, as there will be instances where the cost of installation will be lesser or greater than the figures given. There will be exceptional cases which will require careful study by the appraiser to determine their exact cost. It is well in such cases, whenever possible, to obtain the original contract cost. It is also advisable to refer to catalogues and discount sheets whenever available for prices on all standard equipment.

The probable life of equipment from which to determine the percentage of physical depreciation is given under the separate classifications. This is the average and varies according to use and state of repairs.

TABLE 190.—OFFICE FURNITURE AND FIXTURES

Item	Description	Unit	Cost per unit			
			Wood construction		Steel construction	
			Mahogany and walnut	Oak and birch	Wood-grain finish	Olive-green finish
Roll top desk	Plain 30″ to 36″ wide	Lin. ft.	$20–$25	$15–$18	$50	$48
" " "	Fancy " " " "	" "	20– 30	18– 24	70	
Flat " "	Plain " " " "	" "	12– 14	10– 12	21	23
" " "	Fancy " " " "	" "	14– 20	12– 16	40	
Glass " "	Plate " " " "	" "	2.50 additional			
" " "	Crystal " " " "	" "	2 "			
Office chairs	Ordinary, no arms, no upholstering	Each	17– 21	$ 7–$12		
" "	Ordinary, with arms, no upholstering	"	18– 24	12– 18		
" "	Swivel, no arms, no upholstering	"	24– 30	16– 25		
" "	Swivel, with arms, no upholstering	"	30– 35	20– 30		
" "	Seat & back upholstered in leather, no arms	"	33– 45	25– 33		
" "	Seat & back upholstered in leather, with arms	"	38– 55	30– 35		
" "	Ordinary, all leather upholstered, no arms	"	55– 61	50– 55		
" "	Ordinary, all leather upholstered, with arms	"	60– 75	56– 65		
" "	Swivel, all leather upholstered, no arms	"	60– 71	55– 65		
" "	Swivel, all leather upholstered, with arms	"	80– 90	70– 80		
" "	All chair swith leather pads	"	10– 15 additional			
Tables	Plain, 32 to 42″ wide	"	7– 10	$ 6–$ 9	$11–$12	$10–$11
"	Fancy, " " " "	"	10– 20	8– 12	28	
Costumers	Plain	"	8– 10	6– 8	35	30
Shelving	Plain, 14″	Lin. ft.	.....	.....	.....	0.75
"	" 18″	" "	.....	.....	.....	0.80
"	High base, 14″	" "	.....	.....	.....	0.80
"	" " 18″	" "	.....	.....	.....	0.82
"	Roller, 14″	" "	.....	.....	.....	2.30
"	" 18″	" "	.....	.....	.....	2.75

"	Uprights, inside 14″	" "	.....	.....	.....	0.60
"	" " 18″	" "	.....	.....	.....	0.72
"	Ends, 14″	" "	.....	.....	.....	1.50
"	" 18″	" "	.....	.....	.....	2.00
Bookcases	Sectional, 14″ dee	Section	8– 10	5– 7	8– 14	5– 11
Filing cabinets	Legal size	"	Aver. 10	Aver. 7	Aver. 16	Aver. 14
" "	Legal, with locks	"	$ 6–$10 additional on each cabinet			
Cupboards	20½″ × 51″ × 24½″	Each	$40–$50	$30–$40	$78	$72
Wardrobes	17½″ × 51″ × 24½″	"	35– 45	25– 40	75	70
Steel safes	Fireproof 70½″ × 40⅛″ × 28⅜″	"	fitted with shelving, etc., aver.			435
" "	" 70½″ × 40⅛″ × 36⅜″	"	" " " " "			480
" "	" 70½″ × 60″ × 36″	"	" " " " "			580
" "	" 71″ × 52″ × 38″	"	" " " " "			550
" "	" 74″ × 37″ × 30″	"	" " " " "			360
" "	" 63″ × 26″ × 30″	"	" " " " "			240
" "	" 55″ × 41″ × 28″	"	" " " " "			330
" "	" 44″ × 60″ × 26″	"	" " " " "			240
" "	" 47″ × 41″ × 31″	"	" " " " "			230
" "	" 47″ × 26″ × 31″	"	" " " " "			120
" "	" 38″ × 26″ × 30″	"	" " " only "			90
" "	" 33″ × 22″ × 24″	"	" " " " "			85
" "	" 30″ × 22″ × 24″	"	" " " " "			77

NOTE.—These fixtures have an average approximate life of 33 years, 3% annual physical depreciation, except office chairs which have an approximate life of 25 years, 4% annual physical depreciation.

Physical Depreciation.—Physical depreciation is based upon the straight-line formula. New equipment should be depreciated a minimum of 10 per cent the first year. If the straight-line formula gives an excess of 10 per cent for the first year, the proper percentage should be used. After the first year the straight-line formula should be applied, providing the total depreciation exceeds 10 per cent. Where equipment is subject to obsolescence, an additional percentage should be deducted to arrive at the present value. Obsolescence is frequently applicable to restaurant and hotel equipment, soda fountain equipment, etc. Ordinarily,

TABLE 191.—STORE FIXTURES

Item	Description	Cost, per lin. ft.
Floor cases	Gumwood, plate-glass top, D.S. front and end	$12–$14
" "	Oak and birch, plate-glass top, D.S. front and end	14– 20
" "	Mahogany and walnut, plate-glass top, D.S. front and end	20– 24
" "	Gumwood, full plate glass	14– 16
" "	Oak and birch, full plate glass	16– 22
" "	Mahogany and walnut, full plate glass	22– 28
" "	All glass, full overlapping plate	30
Clothing display cases	Gumwood, sliding glass doors	10– 12
" " "	Oak and birch, sliding glass doors	12– 16
" " "	Mahogany and walnut, sliding glass doors	16– 22
Jewelry display cases	Gumwood	15– 20
" " "	Oak and birch	20– 25
" " "	Mahogany and walnut	30– 35
Counter cases	Pine	4
" "	Gumwood	5
" "	Oak and birch	6
" "	Mahogany and walnut	8
Meat display cases	Oak and birch, single extension glass top	32
Wall cases	Oak and birch, enclosed base and top, 24′ long	18– 22
" "	Oak and birch, enclosed base, open shelf top, 24′ long	10– 14
" "	Floor case, base, enclosed top	30– 40
" "	Open shelving, base and top	5– 10
" "	" " 10″ pine shelves, plain top	2.80
" "	" " " " " cornice top	5
" "	" " 12″ " " " bin base	10
Confectioners' cases	Oak and birch, sloping front, D.S. glass	20– 25
" " "	Sloping front, full plate, all glass	30– 35
Prescription cases	Plain oak and birch, 12′ long	25
" "	Oak and birch, floor case base, 12′ long	40
Soda fountains	Marble front and top, including stools, mahogany and walnut, 12′ long	100
" "	Opalite top, mahogany and walnut, marble trim, 12′ long	100
" "	Marble top, mahogany and walnut, 12′ long	80
Chairs	Wire leg and back	$2.50 each
"	Strap steel, full nickel plate	4.85 each
Facial chair	Full porcelain	$34–$70 each
Dressing table, beauty shop	Maple, 2 mirrors 10″ × 22″	18–26 each
Serving tables	30″ opalite top, metal legs	15 each
" "	30″ oak top, wire legs	6.50 each
Manicure table	Full metal frame, plate glass or opalite top	14– 30 each
Booths	6′ × 5′ pine frame, compo panel	10 each
"	6′ × 7′, 2¼ pine frame, muslin drapes	16 each
Shampoo boards		14 each
Meat block	36″ × 36″ sectional, maple	48 each
" "	30″ diameter, maple	28 each
Safe	Mosler 24″ × 24″ × 30″ high	90 each
"	Charpiot 30″ × 30″ × 60″ high	100 each

NOTE.—Average life, 25 to 33 years.

so long as equipment is in use, no more than 80 per cent depreciation should be allowed, covering both physical and obsolescent depreciation.

Office Mechanical Equipment.—This includes adding machines, calculating machines, typewriters, addressographs, mimeographs,

TABLE 192.—OFFICE MECHANICAL EQUIPMENT

Item	Description	Cost per unit
Cash registers	Model No. K 1,918	$ 295
" "	" " 902 (2) R & S E	475
" "	" " 1,915 (3) E	295
" "	" " 942 (2) R & S E 4	(1 Drawer) 615
		(4 ") 720
" "	" " 2,094 (15) R & S1-c	750
" "	" " 2,056 (5) 1-c	655
" "	" " 2,206 (11)-4	1,695
" "	" " 2,034 (9)-2-c	535
" "	" " 2,175 (5)-1	1,500
" "	" " 2,055 (11) S.T.-4-c	1,500
" "	" " Credit File No. 1	150
" "	" " 962 (2) R.S-E-S-F	850
" "	" " N-2,094 (7)-8-F	1,000
" "	" " 2,275 (11)-8-F	1,800
Obsolete registers	Plain metal, 15 key	75
" "	" " 21 "	125
" "	" " 24 "	150
" "	" " 33 "	200
" "	" " 45 "	$500–$ 750
" "	" " 54 "	750– 1,000
Cash registers	Model No. 211	60
" "	" " 222	95
" "	" " 240	125
" "	" " 711	75
" "	" " 717	130
" "	" " 720	100
" "	" " 726 T	165
" "	" " 726 C.T.	205
" "	" " 746 C.T.	255
" "	" " 730	150
" "	" " 728 T.	190
" "	" " 736 T.	215
" "	" " 746 2-T	305
" "	" " 1,076	245
" "	" " 1,082	195
" "	" " 1,086	270
" "	" " 1,136 E.T.	290
" "	" " 1,128 E.T.	265
" "	" " 1,728 E.	275
" "	" " 1,842	300
" "	" " 1,852	350

NOTE.—The prices quoted on above obsolete cash registers are only approximate as they have not been manufactured for several years and no obsolete quotations are obtainable. For appraising purposes, take 10 to 20% of the cost shown in above table as present value.

TABLE 192.—OFFICE MECHANICAL EQUIPMENT.—(*Continued*)

Item	Description	No. of columns	Cost per unit	Remarks
Adding machines	Straight adding	8	$ 100	Sundstrand
" "	" "	10	125	"
" "	Subtracting	8	125	"
" "	"	9	215	"
" "	"	8	175	"
" "	Credit total	10	150	"
" "	" "	10	175	"
" "	Motor driven subtracting	10	255	"
" "	Adding cash register	7	240	"
" "	Commercial bookkeeping mach.	..	900	"
" "	Bank " "	..	700	"
" "	Duplex	..	500	"
" "	Bookkeeping	..	$ 13–$2,000	Elliot-Fischer
" "	Straight adding, narrow	6	80	Burroughs
" "	" " "	8	100	"
" "	" " wide	8	125	"
" "	" " narrow	10	125	"
" "	" " wide	10	150	"
" "	Adding and direct sub. narrow	8	125	"
" "	" " " " wide	8	150	"
" "	" " " " narrow	10	150	"
" "	" " " " wide	10	175	"
" "	Adding, high keyboard, hand	9	325	"
" "	Duplex	9	375	"
" "	Bookkeeping	13	1,050	"
" "	"	17	1,350	"
" "	Calculator, hand	9	200	"
" "	" electric	9	300	"
" "	Typewriting & bookkeeping comb.	..	$950–$1,050	"
" "	Moon Hopkins bookkeeping	..	1,100	"
Calculator	Motor driven E.B. 9	..	550	Marchant
"	" " E.B.R. 9	..	475	"
"	" " E.D.R. 8	..	425	"
"	" " E.B.R. 6	..	350	"
"	Hand power H. 9	..	350	"
"	" " H. 8	..	300	"
"	" " H. 6	..	200	"
"	" " X. L.	..	250	"
"	" " X. L. A.	..	125	"

Item	Models, hand	Capacity: Lower dial places	Capacity: Upper dial places	Capacity: Keyboard columns	Cost per unit	Remarks
Calculators	K 120	12	6	6	$ 175	Monroe
"	K 160	16	8	8	250	"
"	K 163	16	8	8	325	"
"	K 200	20	10	10	325	"
"	K 203	20	10	10	400	"
.....	L	16	8	8	250	"

TABLE 192.—OFFICE MECHANICAL EQUIPMENT.—(*Continued*)

Item	Models, automatic	Capacity: Lower dial places	Capacity: Upper dial places	Capacity: Keyboard columns	Cost per unit	Remarks
Calculators	KA 120	12	6	6	300	Monroe
"	KA 161	16	8	8	375	"
"	KA 163	16	8	8	425	"
"	KA 201	20	10	10	450	"
"	KA 203	20	10	10	500	"
"	KAA 163	16	8	8	700	"
"	KAA 203	20	10	10	800	"
"	KAS 1,163	16	8	8	575	"
"	KAS 163 F D	16	8	7 + 1	700	"
"	KAS 203	20	10	10	650	"
"	KAS 203 F D	20	10	9 + 1	775	"
"	KAS 203-13	20	7	13	825	"
"	KAS 203-13-F D	20	7	12 + 1	950	"
"	KAS 263	26	13	13	900	"
"	KAS 263 F D	26	13	12 + 1	1,025	"

NOTE.—Demonstrating machines marked KD are hand operated and are 50% off list price. Demonstrating machines marked KAD are electric and are 50% off list. Machines marked RK are rebuilt and are 75% off list price of Monroe machines. Fraction models $25 additional in each capacity.

Item	Description	Cost per unit: Hand	Cost per unit: Electric	Remarks
Typewriters	No. 4	$ 98	....	Underwood
"	No. 5	102	....	"
"	" 3–12	108	....	"
"	" 3–14	112	....	"
"	" 3–16	122	....	"
"	" 3–18	133	....	"
"	" 3–20	150	....	"
"	" 3–26	160	....	"
"	" 10	102	....	Royal
"	" 10–12	108	....	"
"	" 10–14	112	....	"
"	" 10–18	122	....	"
"	" 10–20	150	....	"
"	" 10–26	160	....	"
"	" 10 Q	105	....	"
"	" 6	150	....	Remington
"	" 12	102	....	"
"	" 30	122	....	"
"	" 50	103	....	"
"	.....	....	$200	"
"	Portable	60	....	"
"	.....	....	725	Hoover
Dictaphone	.....	....	195	
Transcriber	.....	....	195	
Shaver	.....	....	125	

NOTE.—The average life of cash registers is estimated at 20 years, adding machines and calculators, 12 years, typewriters, 6 years.

etc. Since there are so many makes of this class of equipment, it is not deemed advisable to list others than those contained in Table 191. On account of the large number of makes and styles, catalogues and discount sheets should be referred to whenever possible in appraising this class of equipment. The average life of office equipment, as enumerated in Table 192, is 6 to 12 years.

TABLE 193.—STORE EQUIPMENT

Item	Description	Cost per unit	Remarks
Scales	Cylinder 7,590, white porcelain	$335	Dayton
"	" 7,591 " "	375	"
"	" 7,580 " "	335	"
"	" 7,581 " "	375	"
"	" 6,590 " "	295	"
"	" 6,591 " "	335	"
"	" 6,580 " "	295	"
"	" 6,581 " "	335	"
"	" 4,580 " "	205	"
"	" 4,590		
"	" 0,380 white and gold	265	"
"	" 0,390		
"	" 144 " " "	155	"
"	Fan 74, gray finish	265	"
"	" 74, gray and gold	275	"
"	" 85, gold and white	165	"
"	" 47 " " "	115	"
"	" 167 " " "	68	"
"	Parcel post 145, gray	155	"
"	" " 85 "	145	"
"	" " 167 "	68	"
"	" " 168 "	68	"

NOTE.—Obsolete styles of cylinder scales range in price from $150 to $300 according to finish. The life average of store equipment is 20 years.

TABLE 194.—HOTEL AND RESTAURANT EQUIPMENT

Item	Description	Unit	Cost per unit	Remarks
Toasters	Electric, 3 slice	Each	$ 70	Strife
"	" 4 "	"	100	"
"	" 8 to 12 slices	"	180	"
"	" sandwich	"	110	"
Waffle bakers	" 2 waffle	"	70	Griswold
" "	" 3 "	"	105	"
" "	" 1 waffle, 1 griddle	"	70	"
" "	" 2 waffles, 2 griddles	"	105	"
" "	" 2 waffle	"	58	Edison
" "	" 1 "	"	35	Wells
" "	" 2 "	"	70	"
" "	" 2 "	"	75	Westinghouse
Drink mixers	" automatic	"	20	All makes
Hot-water urn	" soda fountain style	"	20	" "
Bouillon & fudge warmers	2 jar size, 18¼" × 12½" × 9½"	"	27	Electric
" " " "	3 " " 24" × 12½" × 9½"	"	29	"
" " " "	2 " "	"	17	Gas
" " " "	3 " "	"	20	"
Hot plates	1 burner 12⅞" × 11⅝"	"	15	110 volts
" "	2 " 12⅞" × 23¼"	"	25	110 "
" "	3 " 12⅞" × 34⅞"	"	35	110 "
Food chopper	Motor drive, small size, 910	"	160	Enterprise
" "	" " large " 920	"	225	"
Mixing machines	" " 10 qt. cup	"	155	Hobart
" "	" " 15 " "	"	295	"
" "	" " 20 " "	"	325	"
" "	" " 30 " "	"	410	"
" "	" " 60 " "	"	485	"
" "	" " 80 " "	"	900	"
Meat slicing machines	Models 150,000 to 175,000, elect.	"	795	U. S., pedestal
" "	" 175,000 to 180,000, hand	"	575	" "
" "	" 125,000 to 130,000, elect.	"	565	" "
" "	" 100,000 to 150,000, hand	"	445	" "
" "	" 7, hand	"	363	" "
" "	" B, obsolete, hand	"	310	" "
	All above models of meat slicers $70 less without pedestal.			
Bread slicer	Electric	Each	$335	With pedestal
" "	Hand	"	245	" "
	Bread slicers $45 less without pedestal.			
Toasters	Electric, 600 slices per minute	Each	110	Barth
"	" 1,200 " " "	"	137	"
"	" small size	"	82	"
Meat grinders and coffee mill combinations	No. 5313 a.c. ⅓ hp.	"	235	Dayton
" "	" 5517 " ½ "	"	320	"
" "	" 5728 " 1 "	"	415	"
" "	" 6313 " ⅓ "	"	265	"
" "	" 6517 " ½ "	"	355	"
" "	" 6728 " 1 "	"	450	"

TABLE 194.—HOTEL AND RESTAURANT EQUIPMENT.—(*Continued*)

Item	Description	Unit	Cost per unit	Remarks
Coffee mills	No. 4,003 a.c.	Each	$100.00	Dayton
" "	" 5,001 "	"	135.00	"
" "	" 5,003 "	"	170.00	"
" "	" 5,005 "	"	240.00	"
" "	" 5,077 "	"	390.00	"
" "	" 6,003 F, a.c.	"	205.00	"
" "	" 6,005 F, "	"	275.00	"
" "	" 6,077 "	"	425.00	"
Range canopies	Over kitchen ranges	Lin. ft.	0.90	
Griddle plates	Gas, 18" × 24"	Each	22.00	
" "	" 18" × 30"	"	28.00	
" "	" 18" × 36"	"	35.00	
" "	" 18" × 48"	"	45.00	
" "	" 14" × 18"	"	15.00	
Waffle plate	" 2 iron, black finish	"	19.00	Griswold
" "	" " " nickel "	"	34.00	"
" "	" " " black "	"	27.00	"
" "	" " " nickel "	"	43.00	"
Meat chopper	6,113 F, a.c. ⅓ hp. pedestal	"	205.00	Dayton
" "	6,117 F " ½ " "	"	285.00	"
" "	6,128 F " 1 " "	"	375.00	"
" "	5,113 " ⅓ " "	"	170.00	"
" "	5,117 " ½ " "	"	250.00	"
" "	5,128 " 1 " "	"	340.00	"
Meat slicer	No. 22, red finish	"	380.00	"
" "	" 15 " "	"	310.00	"
" "	" 16, pedestal	"	60.00	"
" "	" 17 "	"	365.00	"
" "	" 18 "	"	60.00	"
Cheese cutter	" 20, blue finish	"	65.00	"
Bread slicer	" 25 " "	"	115.00	"
Refrigerators	3" cork insulation, 6" × 8" × 10"	"	795.00	Oak
"	3" " " 8" × 10" × 10"	"	1,125.00	"
"	2" " " 6" × 8" × 10"	"	760.00	"
"	2" " " 8" × 10" × 10"	"	1,050.00	"
"	3" " " 6" × 8" × 10"	"	660.00	Fir
"	3" " " 8" × 10" × 10"	"	910.00	"

Item	Description	Unit	Cost per unit			Remarks
			Gas	Steam	Electric	
Egg boilers	Automatic, 2 bucket	Each	$50	$ 45	$ 75	
" "	" 3 "	"	68	63	100	
" "	" 4 "	"	85	80	125	
" "	" 5 "	"	103	98	150	
" "	" 6 "	"	120	115	164	
Steam tables	Enclosed base, heavy copper	Lin. ft.	....	0.40		
"	" " light "	"	....	0.35		
" "	Open " galvanized	"	....	0.22		

NOTE.—The average life of hotel and restaurant equipment is 20 years.

TABLE 195.—HOTEL AND RESTAURANT SERVICE

Item	Description	Unit	Cost per unit	
			High grade	Ordinary grade
Dinner knives		Doz.	$ 5.30	$ 2.75
Dessert knives		"	5.10	
Dinner forks		"	5.30	1.60
Tablespoons		"	5.30	1.80
Dessert spoons		"	4.50	
Teaspoons		"	2.65	0.80
Dessert forks		"	5.30	
Bouillon spoons		"	5.00	
Ice tea spoons		"	3.62	1.20
Steak knives	Stainless steel, ivory grained	"	13.50	
" "	" " black rubber	"	10.50	
Stock pots	Aluminum, 2 qt.	Each	5.10	2.00
" "	" 3½ "	"	6.20	3.00
" "	" 5½ "	"	7.80	3.50
" "	" 8 "	"	10.00	4.00
" "	" 15 "	"	17.00	10.00
" "	" 32 "	"	28.00	15.00
" "	" 40 "	"	33.00	20.00
" "	" 60 "	"	41.00	25.00
" "	" 80 "	"	48.00	30.00
" "	" 100 "	"	54.00	35.00
" "	Retinned, heavy, 3 gal.	"	.....	4.50
" "	" medium 3 "	"	.....	2.75
" "	" heavy 5 "	"	.....	5.50
" "	" medium 5 "	"	.....	3.75
" "	" heavy 8 "	"	.....	8.00
" "	" medium 8 "	"	.....	4.50
" "	" heavy 20 "	"	.....	25.50

TABLE 195.—HOTEL AND RESTAURANT SERVICE.—(*Continued*)

Item	Description	Unit	Cost per unit		
			First class	Ordinary	Cheap
Dinner plates	9″	Doz.	$ 7.25	$ 4.85	$ 2.44
Bread & butter plates	6″	"	4.20	3.00	1.50
Pie plates	5″	"	3.05	2.00	1.40
Salad "	6″	"	6.85	3.25	2.05
Cups		"	4.25	3.30	2.05
Saucers		"	2.30	1.76	1.15
Cereal bowls		"	4.00	3.16	1.60
Grapefruit bowls		"	4.05	3.30	2.00
Bouillon cups		"	5.04		
Oyster bowls		"	.....	4.85	1.60
Butter chips		"	1.34	0.75	0.55
3 compartment grill		"	.....	10.80	
Platters	12″	"	23.05	16.00	12.00
"	10″	"	13.90	8.00	6.00
"	8″	"	8.55	6.60	4.00
"	6″	"	5.70	4.00	3.00
"	4″	"	3.80	2.50	1.60
Celery trays		"	14.90		
Sugar bowls	Covered	"	12.60		
" "	Uncovered	"	10.00		
Tea cups		"	5.42		
Saucers		"	3.55		
Egg cups		"	3.70		
Water glasses		"	2.50	1.20	0.60
Sherry "		"	3.00		
Grape juice glasses		"	7.30		
Ice tea "		"	2.00	1.20	0.60
Stock pots	With faucet & strainer	6 gal.	14.00		
" "	" " " "	9 "	15.75		
" "	" " " "	14 "	25.50		
" "	" " " "	20 "	31.50		
" "	" " " "	25 "	37.00		

NOTE.—Average life of hotel and restaurant service is 10 years.

TABLE 196.—GAS AND COAL RANGES

Item	Description	Cost per unit	Remarks
Gas and coal ranges	Restaurant & hotel 30″ 1 oven	$ 185	Home comfort, wrought iron
" " " "	" " " 20″ 2 "	225	" " " "
" " " "	" " " 24″ 2 "	248	" " " "
" " " "	" " " 30″ 2 "	300	" " " "
" " " "	" " " 30″ 3 "	450	" " " "
" " " "	" " " 24″ 2 "	375	" 2″ steel face top
" " " "	" " " 24″ 3 "	480	" " " " "
" " " "	" " " 24″ 2 "	230	" " " " "
" " " "	" " " 24″ 3 "	420	" 1″ " " "
" " " "	" " " 24″ 1 "	222	Majestic
" " " "	" " " 30″ 1 "	270	"
" " " "	" " " 20″ 2 "	285	"
" " " "	" " " 24″ 2 "	325	"
" " " "	" " " 20″ 3 "	358	"
" " " "	" " " 24″ 3 "	425	"
Coffee urns	Single, 3 gal.	47	"
" "	" 4 "	51	"
" "	" 5 "	60	"
" "	" 6 "	62	"
" "	Twin, 3 "	101	"
" "	" 4 "	110	"
" "	" 5 "	124	"
" "	" 6 "	134	"
" "	Two battery, 3 "	142	"
" "	" " 4 "	160	"
" "	" " 5 "	166	"
" "	" " 6 "	170	"
" "	Three battery, 3 "	220	"
" "	" " 4 "	228	"
" "	" " 5 "	238	"
" "	" " 6 "	268	"
" "	Single 4 "	54	Home comfort
" "	" 6 "	60	" "
" "	Two battery 4 "	205	" "
" "	" " 6 "	230	" "
" "	Three battery 4 "	306	" "
" "	" " 6 "	358	" "
" "	Twin 2 "	93.50	Pix superior
" "	" 4 "	109	" "
" "	" 6 "	121	" "

NOTE.—Life varies from 10 to 20 years, depending upon usage.

TABLE 197.—BARBER AND BEAUTY SHOP EQUIPMENT

Item	Description	Average cost per unit
Barber chairs	Hydraulic full porcelain pedestal, body & arm	$165
" "	Hydraulic oak pedestal, body & arm	110
Child's chair	Hydraulic porcelain pedestal, body & arm	117
Hair- cutting chair	For beauty parlors, all wood pedestal, body & arm	110
Facial chair	Universal wood	54
" "	Universal porcelain	130
Electric hair dryers	Sun aero make	90
" " "	Frederick	115
" " "	Marvel	110
" " "	Shelton	110
" " "	Golar	72
Permanent wave machine	Eugene	295
" " "	LeMur	250
" " "	Frederick	185
" " "	Bonat	150
" " "	Leon	240
" " "	Shelton	250
Electric hair clippers	All makes	14
Electric pedestal scalp massage machine	" "	125
Globe hot-water heater	" "	85
Portable hand hair dryers	" "	14
Curling iron stoves	" "	5

NOTE.—All electrical equipment in this table has an average life of about 20 years; all other equipment about 25 years.

TABLE 198.—BANK FIXTURES

Item	Description	Unit	Cost per unit		
			Mahogany and walnut	Oak and birch	Marble
All fixtures	Plain	Lin. ft.	$40–$60	$30–$35	
" "	Fancy	" "	70– 100	40– 70	
" "	Plain	" "	.....	.....	$100–$130
" "	Base only	" "	.....	.....	25– 40
" "	Wainscoting only	" "	.....	.....	15– 20

NOTE.—Average life of bank fixtures is 33 years

THE APPRAISAL OF MUSICAL INSTRUMENTS

The assessment of musical instruments has received little attention on the part of most assessors. This is probably due to the lack of knowledge of the average assessor concerning the value of musical instruments.

When it is considered that pianos range in price, when new, from $275 to $6,500, it will be seen that the assessor who is determined to equalize assessments must consider this as a phase of his work which should be given careful thought. It is just as unfair to assess two persons the same amount when one possesses a piano costing $1,000 and the other has one costing $300 as it is to assess two taxpayers the same amount when one has a $6,000 home and the other a $2,000 home.

Classification of Musical Instruments.—Pianos like many other commodities are valued according to the grade. They are commonly divided into four grades: A or artistic high grade; B or high grade; C or medium grade; D or commercial grade.

Depreciation of Pianos.—Grade A pianos consists of instruments which have been used and endorsed by the world's great artists, having stood the test of time and occupying an exclusive position in musical circles—the standard of comparison. A conservative appraisal for grade A pianos would allow a 25 per cent depreciation the first year. The depreciation would continue to increase up to the thirtieth year at which time instruments of this grade retailing new from $850 to $1,000 would be worth from $180 to $200.

For grade B instruments, the first year's depreciation would be greater. Although these pianos are of fine quality, they do not have the artistic standing and reputation of the grade A instruments; 40 per cent depreciation should be taken off the first year, with a small percentage deducted each year for the following five years, increasing the percentage each year up to the twenty-fifth year, at which time the value should be fixed for future assessment. Grade B pianos would be worth at the end of the twenty-fifth year approximately $120 to $140.

Instruments of grade C construction are usually reputable in character but do not possess either the refinement of tone or the durability of grades A and B. The life of these instruments is shorter, therefore depreciation is much greater. A depreciation of 45 per cent the first year and a small percentage each

year for the following four years should be used, increasing the percentage for the succeeding fifteen years, then reducing the rate slightly until the twenty-fifth year, when the value should be fixed for future taxation.

In the grade D pianos a more difficult problem presents itself as there is little basis for computing a fair appraisal. As a rule they have no real market value, usually being sold for "what the traffic will bear." Their durability is uncertain and their tone and action deteriorate quickly, so that at the end of the first year a depreciation of 55 per cent would be justified and a percentage should taken off each year up to the twenty-fifth year, when an amount approximating $30 to $50 should be considered the appraised value.

The life of a player piano, excepting the higher priced instruments with reproducing mechanism, is from ten to fifteen years. The depreciation of grand pianos is about the same as grade A and B upright pianos. Pianos used by professional musicians, teachers, schools and other public institutions are subject to greater depreciation than those used in the home.

Table 199 gives the average cost of new pianos of the more popular makes. Table 200 gives the depreciation of the various types of pianos. Table 201 gives the depreciation of other musical instruments. Percentages of depreciation are based on present-day retail prices. Where a piano is in unusually good or unusually poor condition, that fact should be taken into account and a modification made in accordance with the facts. For instance, if a piano has a cracked sounding board, a substantial reduction should be made from the regular value, for the worth of the instrument is greatly reduced thereby.

Age of Pianos.—Table 202 gives the serial numbers and dates of manufacture of the more popular makes of pianos. When these are known, the exact age of the piano can be determined. The serial number is generally found on a metal plate under the lid.

TABLE 199.—AVERAGE COST OF NEW PIANOS

Make	Class	Upright	Medium grand	Player
Baldwin	A	$900	$1,100	$3,500
Behning	B	700	1,250	950
Bradbury	C	450	.....	750
Brambach	"	...	795	1,495
Brinkerhoff	"	400	800	500
Bush & Gerts	"	500	1,100	800
Cable, Hobart M	"	485	.....	700
Cable, Nelson	"	395	820	600
Chase, A. B.	B	750	1,200	
Chickering & Sons	A	800	1,650	
Conover	B	650	1,200	1,000
Decker & Son	C	450	1,100	750
Emerson	B	450	900	700
Fischer, J. & Co	"	600	950	875
Gulbransen	C	400	800	700
Haines Bros.	B	525	1,300	1,000
Hamilton	C	450	1,025	750
Hardman	B	800	1,500	1,200
Howard, R. S.	C	500	1,100	750
Ivers & Pond	B	600	1,100	875
Kimball	"	550	1,000	800
Knabe, Wm & Co	A	875	1,475	
Kurtzman & Co	B	500	1,000	750
Laffargue	C	500	800	850
Mason & Hamlin	A	900	1,850	
Miller, Henry F. & Sons	B	800	1,400	1,100
Packard	"	550	1,250	900
Schaaf, Adam	C	500	1,050	750
Schumann	B	525	1,250	875
Smith & Barnes	C	400	.....	575
Sohmer & Co	B	700	1,600	1,200
Steck	"	650	1,000	1,000
Steger & Sons	C	500	.....	750
Steinway	A	940	1,550–4,500	
Vose & Sons	B	575	1,100	875
Weber	"	800	1,400	1,535
Wurlitzer	C	500	800	750

TABLE 200.—DEPRECIATION OF PIANOS

Years	Upright						Grand						Player and electric					
	A		B		C		A		B		C		A		B		C	
	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2	1	2
1	30	35	40	40	45	45	30	35	40	40	45	45	40	45	50	50	60	70
2	33	38	43	43	47	48	33	38	43	43	47	48	42	49	52	53	62	71
3	36	41	46	46	49	51	36	41	46	46	49	51	44	53	54	56	63	72
4	39	44	48	49	51	54	39	44	48	49	51	54	48	57	56	59	64	73
5	42	47	50	52	52	57	42	47	50	52	52	57	50	60	58	62	65	74
6	45	50	52	55	54	60	45	50	52	55	54	60	53	63	60	65	66	75
7	48	53	54	58	56	63	48	53	54	58	56	63	56	66	62	68	67	76
8	51	56	56	61	58	66	51	56	56	61	58	66	59	69	64	71	68	77
9	53	59	58	63	60	69	53	59	58	63	60	69	62	72	66	73	69	78
10	55	61	60	65	62	72	55	61	60	65	62	72	65	75	68	75	70	79
11	58	63	63	68	65	75	58	63	63	68	65	75	67	77	70	77	72	80
12	61	65	66	71	68	78	61	65	66	71	68	78	69	79	72	79	74	81
13	64	67	69	74	71	80	64	67	69	74	71	80	71	81	74	81	76	83
14	67	69	72	77	74	82	67	69	72	77	74	82	73	83	76	83	78	85
15	70	71	75	80	77	84	70	71	75	80	77	84	75	85	78	85	80	87
16	72	73	77	82	80	86	72	73	77	82	80	86	77	86	80	86	82	88
17	74	75	79	84	83	88	74	75	79	84	83	88	79	87	82	87	84	89
18	76	77	81	86	86	90	76	77	81	86	86	90	81	88	83	88	86	90
19	78	79	83	88	88	78	78	79	83	88	88	83	83	89	84	89	88	
20	80	81	85	90	90	..	80	81	85	90	90	..	85	90	85	90	90	
21	81	83	86	..	..	..	81	83	86	..	..	..	86	..	86			
22	82	85	87	..	..	..	82	85	87	..	..	..	87	..	87			
23	83	87	88	..	..	..	83	87	88	..	..	..	88	..	88			
24	84	89	89	..	..	..	84	89	89	..	..	..	89	..	89			
25	85	90	90	..	..	..	85	90	90	..	..	..	90	..	90			
26	86	..	..	..	..	..	86											
27	87	..	..	..	..	..	87											
28	88	..	..	..	..	..	88											
29	89	..	..	..	..	..	89											
30	90	..	..	..	..	..	90											

NOTE.—Columns headed 1 and 2 signify private use and use in schools or institutions, respectively.

TABLE 201.—DEPRECIATION OF MUSICAL INSTRUMENTS, PER CENT

Year	Band	Phonograph	Radios, battery	Radios, elec.	Accordion
1	45	50	50	40	50
2	50	60	70	60	60
3	55	70	80	70	70
4	60	80	85	80	80
5	65	90	90	90	90
6	70				
7	75				
8	80				
9	85				
10	90				

TABLE 202.—PIANO SERIAL NUMBERS

Make	Serial Numbers			
Behning	1890–25400	1900–29900	1910–37600	1920–47100
	1895–28000	1905–32600	1915–42900	
Bradbury	1875–13523	1890–22393	1905–32697	1919–38804
	1880–16156	1895–26543	1910–35203	
	1885–18936	1900–29431	1915–37287	
Brambach	1900–7900	1910–18700	1919–36800	1929–72000
	1905–14500	1915–27500	1924–52000	
Brinkerhoff	1920–156814	1925–200394	1928–224287	
Bush & Gerts	1890–4000	1900–22000	1910–45000	1920–62000
	1895–14000	1905–33000	1915–55000	
Cable, Hobart M.	1901–1901	1910–30946	1919–56700	1929–87700
	1905–15390	1915–47285	1924–74500	
Cable, Nelson	1905–35000	1915–88000	1925–145035	
	1910–60000	1920–117700	1929–178882	
Chase, A. B.	1885–16000	1900–42000	1915–58000	1929–72000
	1890–25000	1905–40000	1920–62000	
	1895–36000	1910–54000	1924–66000	
Chickering & Sons	1890–78063	1905–103413	1920–131196	
	1895–84976	1910–114789	1925–140296	
	1900–91210	1915–122616	1929–147088	
Decker & Son	1890–15289	1900–20167	1910–27341	1920–33595
	1895–18275	1905–23879	1915–30787	
Emerson	1890–49900	1905–82486	1920–114670	
	1895–62278	1910–95412	1925–121184	
	1900–70280	1915–106209	1928–122713	
Gulbransen	1915–90000	1920–137640	1925–225397	1929–295596
Haines Bros.	1905–47294	1910–53113	1915–61671	1925–72795
Howard, R. S.	1902–10000	1912–30000	1920–47000	
	1907–20000	1917–40000		
Ivers & Pond	1907–40307	1910–47585	1915–58078	1920–66924
Kimball	1900–69014	1910–211684	1920–320302	1929–384801
	1905–140417	1915–269867	1925–347370	
Knabe, Wm., & Co.	1890–41999	1900–49461	1910–70238	1920–89225
	1895–43550	1905–59410	1915–79725	1925–105992
Kurtzman & Co.	1921–83344	1925–94162	1929–100102	
Laffargue	1905–32500	1915–63000	1925–84276	
	1910–45000	1919–74000	1928–86241	
Mason & Hamlin	1912–20000	1920–29000	1929–39690	
	1915–24000	1925–33570		
Miller, Henry F., & Son	1890–18500	1900–28500	1910–38500	1920–48500
	1895–23509	1905–33500	1915–43000	
Packard	1919–126000	1924–131800	1929–136000	
Schumann	1902–8000	1912–25885	1920–41770	1929–52329
	1907–15000	1917–36729	1925–48783	
Sohmer & Co.	1881–6000	1895–23000	1910–37000	1928–70528
	1885–10000	1900–26000	1915–44000	
	1890–16000	1905–32000	1918–47000	
Steck	1919–61000	1924–65500	1927–70000	
Steger & Sons	1915–21000	1917–225592		
Steinway	1890–66868	1900–94313	1910–139151	1924–222000
	1895–79820	1905–113568	1920–195390	1929–261000
Vose & Sons	1881–13800	1895–36000	1910–68000	1925–92918
	1885–17000	1900–44000	1915–78000	
	1890–26300	1905–57000	1920–86000	
Weber	1919–72000	1924–76000	1929–80000	
Wurlitzer	1928–102029			

THE APPRAISAL OF HOUSEHOLD GOODS

"Cash value" has been defined as "the price which a willing seller will take and a willing buyer will give under normal conditions"; therefore, in dealing with household goods the price for which such goods could be sold by the home owner does not represent the cash value, since they cannot usually be disposed of except at a sacrifice. Such a sale, of course, does not satisfy the conditions set forth in the definition, in as much as the circumstances under which they are sold are not normal.

The only type of sale that does meet these conditions is that of the dealer to the purchaser. The standard of value to be adopted for such goods is, therefore, *the price for which the articles could be sold by a dealer in their present condition.*

If second-hand furniture is in fairly good condition, it is sold by dealers for approximately 50 per cent of the original cost, so that this may be taken as a conservative basis for the appraisal of furniture in the average home. In cases where furniture has received unusually hard wear or has become obsolete, a greater amount of depreciation should be allowed. This amount must be determined by the person making the appraisal.

The price received at an auction or sacrifice sale should not be taken into consideration in placing a value on furniture, as these prices vary according to the number of persons present and their needs.

Some goods are sold at a much higher price than their actual value because of someone's immediate need for a certain piece of furniture or his lack of knowledge of values, while other pieces are sold below their true value, because at that particular time there may have been no one attending the sale who had need of the articles offered.

Quality is a very important factor in appraising used furniture, due to the fact that an expensive or standardized article will not depreciate so fast as one placed upon the market for only a short time to satisfy a temporary need.

Types of Homes.—In order to present facts in as concrete a manner as possible, we list below three distinctive types of homes and the value of the furniture in each room of these homes:

Modest Home, Living Room.—A three-piece suite of oak and brown leather or mahogany and blue leather, a floor lamp, a

velvet or Axminster rug, one rocker, an oak or cheap mahogany library table. Value $75.

Modest Home, Dining Room.—An eight-piece golden oak, mission or other inexpensive dining room set, a velvet or Axminster rug. Value $50.

Modest Home, Bed Room.—An inexpensive Simmons steel or brass bed with hair mattress and fabric steel or single coil spring, an oak or mahogany dresser or chiffonier, a stand and chair, a velvet rug. Value $35.

Modest Home, Kitchen.—An inexpensive gas or coal range, kitchen table, four chairs, kitchen cabinet, refrigerator, printed lineoleum. Value $45.

The furniture in this modest home with the average amount of miscellaneous equipment should be assessed from $250 to $300.

Medium Home, Living Room.—A two-piece velour or inexpensive mohair suite, Wilton rug, console mirror, two floor lamps, a Coxwell chair, mahogany or walnut veneer davenport table, end table, magazine rack, occasional chair. Value $225.

Medium Home, Dining Room.—Eight-piece walnut veneer suite, medium Wilton rug. Value $150.

Medium Home, Bed Room.—Three-piece walnut veneer suite or twin beds with double deck coiled springs, medium Axminster rug, stand, chair. Value $115.

Medium Home, Kitchen.—Good gas range, kitchen cabinet, table and four chairs, lineoleum, refrigerator. Value $95.

With miscellaneous goods the medium home should be assessed from $650 to $850, according to the number of bed rooms.

Good Home, Living Room.—Three-piece mohair overstuffed suite of good quality, webbed construction with reversible cushions of linen frieze or needlepoint tapestry; rug which is either first-class Wilton, Gulistan or Hartford-Saxony; walnut davenport table; end table; magazine rack; two floor lamps; good Coxwell or Pilaster chair; mantle mirror. Value $450. (If Chinese rugs are used add difference in value between Wilton and Chinese.)

Good Home, Dining Room.—Eight-piece highly decorated walnut suite, high-grade Wilton rug, tea cart. Value $300.

Good Home, Bed Room.—Three-piece walnut suite or twin beds with Ace or DeLuxe springs, Wilton rug, night stand, rocker and straight chair. Value $200.

Good Home, Kitchen.—Combination range, kitchen cabinet, table and four chairs, lineoleum, refrigerator. Value $150.

With miscellaneous equipment this type of home should be assessed from $1,400 to $1,800, depending upon the number of bed rooms.

The item "miscellaneous equipment" which occurs in the appraisal of the above three homes includes such things as curtains, draperies, linens, silver, china, cooking utensils, pictures, throw-rugs, bedding, etc. Special attention also should be paid to the electrical devices such as vacuum sweepers, refrigerators, washing machines, mangles and other household appliances of this type, the value of which should be added to the above appraisal figures.

In the more pretentious homes in addition to the finest grades of period furniture and oriental rugs, such items as imported tapestries, rare vases, marble or alabaster statuary, Dresden ware, porcelains, teak-wood chairs and stands, art pieces in bronze, Florentine mirrors, English prism sets and other articles of this kind are found so frequently that the services of an art expert should be enlisted in order to secure a proper appraisal.

While it has been impossible to give specific prices on each item to be found in the home, it is hoped that the information given, supplemented by a careful study of the different types of furniture, will be a definite help to the appraiser and will result in a more equitable assessment.

The Appraisal of Hotel Furniture.—Hotels may usually be classified under five groups:

1. Hotels which command the highest class of patronage.
2. Hotels which do not have the accommodations to take care of those demanding the best.
3. The family hotel.
4. The smaller and cheaper hotel.
5. The rooming house.

The guest-room furniture in the first-class hotel constitutes about 20 per cent of the total investment and the average life is about 12 years. This is the utility life and does not represent the actual life of the furniture, because, in about this number of years, the hotel is forced to dispose of these articles and replace them with newer and more up-to-date articles in order to command the higher class patronage. There is a residual value, therefore, which must be taken into account when replaced.

This furniture is sold to the second-hand dealer who in turn sells it to the smaller hotels or rooming houses. With ordinary care it should last from 25 to 30 years.

The life of lobby furniture is usually about 10 to 12 years; carpets and rugs about 6 years; springs, mattresses and pillows about 9 years. The average hotel guest is not so careful with the furnishings as he would be if they were his own, so depreciation is much greater. Hotel furniture receives very hard usage and thus depreciates much more rapidly than that in the home. Dresser tops are used for ironing, thereby marring and blistering the finish; cigarettes and cigars are carelessly laid on desks or stands, leaving burns or stains; or the ashes are dropped on the carpets, burning small holes. In purchasing furniture, hotels receive a very liberal discount. Most hotels buy at 10 per cent above cost to the dealer, the reason for this being the quantity of their purchases.

Because of the wide variation in hotel furniture, it is impossible to place a standard value per room. A fair method of appraisal is to allow 10 per cent depreciation per year from the original cost up to and including the fifth year, thereby arriving at 50 per cent of the cost at the end of the fifth year. From this time on, the replacements made should be considered as covering any depreciation, providing the replacements do not exceed a reasonable figure. Hotel furniture over five years of age, if in very poor condition, should receive a further depreciation, the amount to be determined by the appraiser.

THE APPRAISAL OF DIAMONDS

A diamond, to be classed as "perfect," must combine all three of the following qualities: perfection in color, perfection of cut and absence of flaws. The ordinary diamond can be classified under one of three general colors; blue-white, white or yellow. The blue-white diamond has the greatest commercial value and is often called "the diamond of character," due to its individuality in retaining its distinctive blue color under any and all conditions. Next in value comes the white diamond, an absolutely colorless stone, so delicate that it takes on the predominant hues of its surroundings. Last and least valuable is the yellow diamond. While these stones are very dull in the daylight, at night, under artificial light, the yellow diamond is the most beautiful of all, throwing off brilliant flame-like rays which make them very desirable for evening wear.

Table 203 gives the prices of perfect diamonds, classified as to color, in the ordinary sizes.

TABLE 203.—DIAMOND VALUES

Color	Carat	Value, per carat
Blue white	¼ to ½	$250
" "	½ to ¾	375
" "	¾ to 1	500
" "	1 to 1¾	600
White	¼ to ½	175
"	½ to ¾	250
"	¾ to 1	325
"	1 to 1¾	400
Yellow	¼ to ½	125
"	½ to ¾	175
"	¾ to 1	250
"	1 to 1¾	300

Yellow or white gold mountings sell from $10 to $20 and the ordinary platinum setting sells from $50 to $100. The platinum settings can be readily distinguished from the white gold by their extreme dullness. The small diamonds used in wedding rings are worth about $4 each and, by adding the value of the setting to the number and amount of the diamonds, a fair value may be determined.

THE APPRAISAL OF CLOCKS AND WATCHES

Plain mantel clocks will be found to cost about $15; chime mantel clocks from $50 up; men's watches, to pass railroad inspection, cost from $60 to $65 and the 21-jeweled watches sell at $120. The ordinary 17-jewel man's watch is priced at $35 for the 16 size and $40 for the 12 size. In wrist watches, either for men or women, the 7-jewel Swiss watch sells at $12; the 7-jewel American watch at $35; the 15-jewel American at $45 and the 17-jewel American at $75. The more expensive wrist watches must of necessity be appraised by an expert watchmaker as they sometimes are valued at several hundred dollars. This is true also of hall clocks and some of the specially built French clocks.

The Appraisal of Silverware.—Rogers, Community and Holmes and Edwards plate, usually sold in sets, sell for $35 for the 26-piece service, while sterling silver 26-piece sets can be

bought for $75. A fair average value for solid silver pieces, knives, forks and spoons is $5 each.

THE APPRAISAL OF LIVESTOCK

Table 204 gives the values at which livestock is assessed in the 1930 Denver schedule.

TABLE 204.—VALUATION (1930) OF LIVESTOCK

Animal	Description	Unit	Price
Dairy cows	Common	Each	$40
" "	Grade	"	50–60
" "	Purebreds	"	Judgment
Range cattle	Bulls	"	$60
" "	Stock calves, coming yearling	"	27
" "	Stock cattle, 2 yr. and over	"	35
" "	Steers, 2 yr. old	"	35–45
Sheep	Ewes	"	2–3
"	Navajos	"	3–5
"	Stock, yearlings and over	"	8
Horses	Work stock 900–1,200 lb.	"	25–40
"	" " 1,200–1,400 lb.	"	40–75
"	" " 1,400 lb. and up	"	70–100
"	Fancy stock, riding and driv.	"	Judgment
Mules	Light	"	$25–$40
"	Medium	"	50–75
"	Heavy	"	75–100
Burros		"	5
Hogs		100 lb.	7
Poultry	Chickens	Doz.	5
"	Turkeys	"	20
Bees		Stand	4
Dogs, cats			Judgment

CHAPTER XXV

THE APPRAISAL OF INTANGIBLE PROPERTY, STOCKS, BONDS, NOTES, ACCOUNTS RECEIVABLE AND CASH

Fallacy of Attempting to Assess Intangible Property.—Many states have abandoned the idea of assessing intangible property in the same manner that other property is assessed. Formerly, most states made no distinction between the different classes of wealth, but experience has shown that a general property tax cannot be successfully collected on intangible property for the reason that it can be so easily hidden. Money can be concealed; and if it is placed on deposit in banks, in many states the banks cannot be compelled to open their books to the assessor. This effectually conceals the amount of money deposited by taxpayers in the banking institutions. Similarly, the safe deposit boxes contain securities, many of which are taxable but inaccessible to the assessor.

One of the objections to the assessment of intangible property under the general property tax system is the encouragement it gives to perjury. This system puts a premium on dishonesty, because any taxpayer may avoid the payment of tax on this part of his wealth by merely omitting it from his schedule. If he omits it after taking oath that the property returned is all the property which he has, he commits perjury; and, when it is considered what a small amount of intangible wealth actually finds its way onto the tax rolls, it will be realized how extensive, in some jurisdictions, this practice of perjury in connection with tax returns has become.

It seems paradoxical that legislatures would enact laws and then decline to give the assessor the necessary power to enforce those laws in a practical manner. Take, for instance, the states in which the law requires the assessment of money, yet no law is provided enabling the assessor to require the banks to open their books. The probable reason for such a situation is not difficult to see. Legislators who have taken the time to study the

situation know that the assessment of all money held by banks on deposit, in demand, savings and other accounts, would result in the closing of practically all of the banks within their jurisdiction.

Assume the tax rate to be 30 mills. This would mean that taxpayers would have to pay 3 per cent taxes on every dollar they carried in the banks. This would practically consume the income from savings accounts and it would have to come out of capital in the case of demand deposits. People would simply draw their money out of the banks and adopt other methods for handling it.

The tendency over the country is to eliminate intangibles from general property assessment and to substitute an income tax or some other similar method of taxation. Some states, realizing the futility of assessing intangible property at the same rate as other property, have what is called "classified general property tax" systems whereby intangible property is assessed at a lower rate, the theory being that, if assessed at a lower rate, more people will voluntarily declare intangible property in their returns.

The experience, generally, is that there is more income if this method is adopted, but few consider it as the ideal solution of the problem.

Capital Stock.—Regardless of the theory discussed in the preceding section, the main reason for considering the subject of intangible property is to indicate how best to proceed in those states requiring its assessment. Many states that retain this system have specifically exempted capital stock from assessment. This is as it should be, for the reason that capital stock certificates merely represent wealth that has been contributed to a corporation for use in its business, which wealth is taxed in some form or other; therefore, a tax levied on the shares of stock would be a duplicate assessment.

Where capital stock is not exempted, it becomes the duty of the assessor to locate and assess all shares of stock held within his jurisdiction. In the case of foreign corporations this is practically an impossibility, since the record of stock ownership is kept in another state. Stock broker's records are a source of information, if they can be obtained, but access to such records is ordinarily difficult. In the case of domestic corporations the stock records of the issuing companies will show the location

of their stock which, under the general rule, is assessable at the domicile of the owner; therefore, the geographical location of the certificates themselves is immaterial, the important thing being the address of the owner. If he resides within a given jurisdiction, he can be assessed there.

Another problem in connection with the assessment of capital stock is the determination of its value after it has been located. If it is a listed stock, it is comparatively simple. If not, the value must be determined by the sales made; if none has been made, or if no information can be secured as to the basis of such sales, the next best method of procedure is to determine the book value as shown by the books of the issuing corporation. Before stock is assessed at a value greater than par, the assessor should determine such facts as would justify the higher valuation. On the other hand, if stock is assessed at par and a taxpayer protests on the ground that it is worth less than par, the burden of proof should be on the taxpayer. If access can be had to the books of the issuing corporation, the balance sheet should be examined carefully to see that all assets are properly valued and that all liabilities are stated. This does not mean that the assessor should make a balance sheet audit, for it would be impossible to do that and cover all the assessments it is necessary for him to make, but a sufficiently careful perusal should be made to satisfy the assessor that the balance sheet is approximately correct. When this has been done, the net worth, as shown by the balance sheet, should be divided by the number of shares of capital stock outstanding, to determine the book value.

Bonds.—Bonds generally fall into two classes—exempt and taxable. Exempt bonds include all issues of the federal government and all issues of the state itself and the political subdivisions within the state, such as counties, school districts, etc. In addition to this, several states exempt certain other kinds of bonds. In some states, bonds secured by property within the state are exempt, while bonds secured by property elsewhere are taxable. This is on the theory that the money represented by the bonds, if secured by property within the state, has already been taxed; to tax both the property and the bond itself would be double taxation. The fault in this theory lies in the fact that if the reason with respect to bonds issued against property in the state is sound, it is equally true in cases where property lies outside the state, the only difference being that the state under

consideration is not receiving two taxes on the same property, but the taxpayer is paying twice on the same property. It is difficult to see the difference between capital stock and bonds from a tax standpoint. In both cases the pieces of paper evidencing the ownership are merely evidences of wealth in the possession of some one else.

Suppose a corporation is formed in the state of New Jersey with a million dollars worth of stock and a million dollars worth of bonds authorized. Suppose this corporation sells these securities in Colorado, the proceeds being invested in a manufacturing plant in New Jersey. The corporation will pay a tax on the two million dollars invested in the plant in the state of New Jersey. Under the Colorado law the holder of the stock in Colorado will have no tax to pay thereon, it being specifically exempted by statute, but the holders of the bonds in Colorado will have to pay tax on a million dollars worth of bonds. In other words, while there is but two million dollars worth of wealth involved in this case, taxes are being paid on three million dollars worth. The man who has been conservative and has put his money in bonds instead of stock is paying a tax on his investment, while the man who wishes to take a speculative risk and puts his money into stock pays no taxes. This is manifestly inequitable. Neither of the securities should be taxed. Securities should not be considered as wealth; they are merely the evidences of wealth which is employed somewhere and is presumably paying a tax. This does not mean that the owners of some securities should not pay some tax, but it should not be placed in the category of a property tax and assessed on the same basis as actual wealth.

The property of a corporation issuing bonds is owned by two classes of investors: those known as stockholders and those known as bondholders. There should be no difference in their treatment from the standpoint of taxation. Facing the situation that will be encountered in those states levying general property taxes on bonds, the problem of valuation arises after locating bonds within the assessor's jurisdiction. Much the same procedure must be followed here as in the case of stock. If the bonds are listed on the exchange, prices can easily be determined as of the fiscal date when the tax lien attaches. If they are unlisted bonds, then the assessor must rely upon private sales, if any are available, or upon opinions of persons in a position to know their value.

If the books of a corporation are obtainable, they will undoubtedly furnish fairly satisfactory evidence as to the value of the bonds. In the case of bonds it is much safer to assume that they are worth par, which condition does not always exist in the case of stocks. Bonds usually are a first lien on property of the corporation.

Secured Notes.—Secured notes in most states are in the same category as bonds; that is, if they are secured by property within the state, they are exempt. If they are secured by property outside the state, they are taxable. Where they are assessable, about the same difficulty is encountered in finding them for assessment purposes as in the case of other securities. The necessity of a close follow-up on promissory notes may cause records to be kept which will be easily accessible to the assessor. Ordinarily, records of promissory notes are difficult to find. When the notes are located, the matter of valuation becomes the important consideration. If the assessor happens to be in a position to judge as to the responsibility of the makers of the notes, the estimate can be based upon that knowledge. If he does not have such special knowledge, he must rely upon information secured from the owner. If the company handles notes regularly as a matter of policy in its business, the percentage of loss in the past may be a fair guide as to the value of those remaining on hand.

Notes not yet due should be considered as being worth face value unless the maker has actually failed. Notes that are past due must be judged according to the period of delinquency. When secured, the collateral back of the notes ordinarily represents the real value of the notes; so in addition to investigating the general standing of the makers, an appraisal of the notes may resolve itself into the matter of appraising the collateral back of the notes.

Unsecured Notes.—Unsecured notes are assessable wherever intangible property is taxed. The matter of valuation is very much the same as in the case of secured notes, except that they do not have the collateral back of them, and, therefore, the credit of the maker is the sole basis of consideration in estimating the value.

The appraiser should be very conservative in placing value on past-due promissory notes that are unsecured.

Accounts Receivable.—The value of accounts receivable must be determined largely from the books of the taxpayer. If any records at all are kept, accounts with customers will be found. If a company has been in business for a number of years, the matter of evaluating their accounts will be comparatively easy, provided their accounts are complete for the whole period. Every concern that sells goods to customers on account will lose a part of those accounts. The amount of loss will be determined by the character of the goods sold as well as the character of the customers. In the absence of extraordinary changes in economic conditions, the experience of two, three or more years as to the percentage of loss will be a safe guide for the future; therefore, if such a percentage of loss can be established, it may safely be applied to the present outstanding accounts to determine their actual value. Where such information as to past experience is not available, as in the case where no records are kept or where the business is new, the appraiser should base his judgement upon the experience of others in a similar line of business and similarly situated.

If the accounts are few, the appraiser may be able to confer with the manager and review each account individually, taking into consideration the age of the accounts, the present financial condition of the debtor, etc., and, from such a scrutiny, place a value on the entire list of accounts.

Where it can be done, a percentage based on sales is the best method of determining the amount of bad debts that will eventually be realized.

A few years ago one of the authors had an interesting experience in estimating uncollectible accounts. He was called in to audit the books of a company that had been operating for a little less than two years. Uncollected accounts were standing on the books, representing sales made during each month of the entire period. The accounts were analyzed and the charges remaining on the books classified according to the month in which the sales were made. A reserve was then set up as follows: 1 per cent was set up for those accounts that had been placed on the books during the last 30 days, 2 per cent was allowed for those from 30 to 60 days old and 3 per cent for those from 60 to 90 days old, and so on, adding 1 per cent for each month the accounts had remained on the books. During the following few years opportunity had to observe the actual loss from these bad debts and

comparing it with the estimated reserve. When the accounts standing on the books at the time of the audit were finally liquidated, the losses were found to be almost exactly the amount of the estimated reserve that had been set up. This of course was a mere coincidence, and the same method might not give the same result in other cases. The experiment is interesting, however, in that it demonstrates that the ratio of losses increases with the age of the accounts.

Accounts receivable other than customers' accounts should be investigated carefully before placing a value thereon, for it will be found that in many cases such accounts are of extremely questionable value. Accounts against subscribers to capital stock represent one class of accounts where the value is usually nominal. In those cases the stock is ordinarily held by the company as security for the accounts. If the subscriber continues to pay on his subscription, all well and good; if not, very seldom are attempts made to collect the account, the stock merely being cancelled. In any case, it is doubtful if such accounts should be considered as having value for the purpose of assessment. An account receivable representing a subscription to capital stock is nothing more than a promise to invest in the company. Since the investment has not been made, the company has no taxable asset. The wealth which that account receivable represents is in the hands of the subscriber and is taxed to him until the company actually receives it.

Cash.—The assessment of cash has been covered to a certain extent under another section of this chapter. The chief difficulty in assessing cash lies in the problem of finding it. When found, it is the easiest of all assets on which to place a value. The theory of taxing cash is unsound, since cash itself does not represent property but merely a medium of exchange. But the purpose of this manual is to present methods which may be helpful in appraising property and not to lay down logical theories as to what should and should not be assessed.

Instead of taxing a man on the amount of cash he has at a given date, some states levy the tax on the average cash in the hands of the taxpayer during the year ending at a given date. Where this is done, it becomes necessary to determine the amount of cash in one's possession at different dates during the year. For instance, if a cash balance could be determined as of the first of each month during the year, these twelve balances would be

added together and the sum divided by 12 to determine the average cash balance. In the majority of cases this procedure will result fairly to both the taxpayer and the government. If the taxpayer's cash balances fluctuate considerably between the different periods in the month, this method may not be fair. If the balances happen to be higher at the first of the month than they are during the remainder of the month, it would be unfair to the taxpayer, and, on the other hand, if they are lower at the first of the month than at any other time during the month, it would be unfair to the government. Where such conditions exist, the balances should be determined more frequently than monthly. For instance, they might be semi-monthly, weekly or even daily. Many business houses have substantial balances on the first of the month, but after paying their bills, say on the tenth of the month, these funds are greatly depleted. In such cases it would be unfair to assess on the amount of cash on hand at the first of the month.

Intangibles of Residents Kept in Other Jurisdictions.—The common law rule is that the situs of intangible property is at the domicile of the owner. States, however, can enact laws establishing the status of any class of property for the purpose of taxation; therefore, any state can enact a law to the effect that intangible property kept within its jurisdiction, regardless of the domicile of the owner, may be subject to tax. Also it may enact laws exempting from taxation intangible property of its own residents kept in other jurisdictions. In the absence of specific statutes covering these points, the common law holds that in most cases intangible property is assessable to the residents of the taxing jurisdiction.

If intangibles are difficult to locate when they are actually kept within the jurisdiction of the assessor, it will manifestly be more difficult to find them when kept elsewhere. Reliance must usually be placed upon the voluntary return of the taxpayer or upon his records. The problem is purely one of finding the asset, the valuation of which will be covered by the principles already discussed.

Foreign Corporations.—A very important matter arises with reference to the domicile of a corporation for the purpose of taxation. Some authorities hold that the domicile of a corporation is in the state where the charter of the corporation is granted, and, that in view of the common law theory, the corporation

is taxed on all its intangible property by that state. This being the case, prospective corporations will naturally choose a state where intangibles are not taxed, and they will file their articles of incorporation in that state. The inequity of the situation is apparent.

Suppose a company incorporates in the state of New Jersey, then it establishes its business office in Colorado and carries on its entire business in the state of Colorado. If the common law rule is applied, they will escape taxation entirely on all their intangible property. The corporation is not a legal resident of Colorado, and therefore Colorado can not tax its intangible property. Its legal residence being in New Jersey, that state has the power to tax its intangibles, but it has specifically exempted its residents from the payment of taxes on intangibles, so those assets go tax free.

While, as stated, some authorities have held that this is the situation, it has not been true in all cases. The Supreme Court of the United States held in Adams Express Co. *vs.* Ohio State Auditor 166 U. S. 979 . . . "that no fine-spun theories about situs should interfere to enable these large corporations, whose business is carried on through many states, to escape from bearing in each state such burden of taxation as a fair distribution of the actual value of their property among those states requires." In view of this authority it can probably be established that no taxpayer can use the place of incorporation as a means of avoiding taxation.

Branch Houses.—A question arises where branch houses are established and where certain intangible assets are known to exist. For instance, a business concern in one state may establish a branch in another state and at that branch keep money on deposit, carry customers' accounts and collect them, and, in all other ways, carry on business as if the branch were an independent concern. Then the question arises as to whether these intangible assets are assessable where the branch is located, or where the company has its principal place of business, or where the company is incorporated. The decision of this point will rest on the facts covering their method of operation. If the local branch business is carried on by a foreign corporation in the sense that it may be said that the foreign concern is "doing business" within the state, thereby requiring in most states the filing of copies of its articles of incorporation, then a business

situs would be established in the state where the business is transacted, and in such cases money and accounts receivable acquired as a result of such business would be taxable there. This would be the case even though the concern might, as a subterfuge, keep the books of account in a foreign jurisdiction to avoid taxation. The point would hinge on the place of doing business. On the other hand, if the foreign corporation instead of doing business in the state merely had an agent there who took and transmitted orders to the home office in another state where the business is consumnated, the accounts receivable resulting from such transactions would not be taxable in the state where the orders were taken, notwithstanding, the concern might at all times have, in the possession of its branch or its agent, a large line of samples from which selections could be made as the basis for orders to the home office. In the latter case it would be held to be interstate commerce instead of doing business within the state.

A question sometimes arises as to the authority for taxation of intangibles of a company incorporated and doing business within a given state, when its business operations are scattered through many counties in that state. In the absence of statute the taxes on intangibles would ordinarily go to the county in which the principal office is located. As a matter of equity there should be a division among the counties.

In Colorado there is a specific statute covering this situation which provides as follows:

> In respect to every corporation having property and doing business in two or more counties of this state *only*, other than those assessed by the State Board of Equalization, the County Assessor shall assess that part of the intangible property of any such corporation in the proportion that its tangible property in the County bears to the tangible property wherever situated.

Investment Houses.—Investment houses must be classed either as financial institutions analogous to banks, or as ordinary corporations. Their tax situation will be determined in some states in accordance with their designation in this respect. If they are considered in the same category as banks and the banks are assessed on the value of their capital stock, then investment houses would not be entitled to deduct investments in exempt securities. If considered as ordinary corporations, they would be permitted to deduct investments in exempt securities.

In the absence of state laws governing these institutions, they should be considered as ordinary corporations regardless of the nature of their business. This will usually result in a very small assessment compared with the size of the company, since the average investment house will carry a large amount of tax-exempt securities.

Building and Loan Associations.—In states where intangible property is assessed, building and loan associations should pay taxes the same as any other financial institution, but in some states the promoters of these institutions have been shrewd enough to have such laws enacted as to exempt them from nearly all taxes. For instance, in a state which exempts corporate stock and also members of building and loan associations from taxes, building and loan associations will secure a law allowing them to deduct their credit to members or the stockholders as a liability in determining their tax status. Since practically all of the wealth of a building and loan association is represented by the amounts contributed by members, it will pay little or no tax, and the members can not be taxed on their investment.

It is clearly wrong to treat stockholders' investments as a liability of the business, but such laws have been enacted and are in force today in some states.

Banks.—The situation of banks in regard to taxation has been in an unsettled state for a number of years. The tendency has been to assess banks as a unit regardless of the character of the assets held by them. In order to bring about this situation, the device generally employed has been not to tax the bank itself but to enact laws under which the stock of the bank is assessed to the owner, the bank being made the agent of the owner for the purpose of the collection of the tax. Under such a law it is clearly the duty of the assessor to determine the value of the stock of the bank and levy a tax upon that valuation. It is usually difficult to determine the value of bank stock since it is ordinarily held within a limited circle, and sales thereof are few and are not publicly known. For this reason, where such laws exist, the custom is generally to assess the stock on its book value which is represented by the capital stock, surplus and undivided profits. Since other factors besides the book value of the assets affect the actual value of the stock, accurate valuation will not always result from this method, but it is perhaps as close an approximation of value as can be obtained in most cases.

Objection has recently been made by the banks in some states on the ground that such procedure is unconstitutional, for the reason that it results in assessments on banks disproportionate to that levied on other monied capital. In this connection the point is raised that a bank carries investments in tax-exempt securities, and by taxing the stock they are not allowed the exemptions that are allowed other taxpayers. The situation has become so acute in many of the states that the laws are being changed, and the status of banks in regard to taxation will undoubtedly be considerably altered during the next few years.

In assessing bank stock a deduction is made for tangible property, inasmuch as this class of property must be assessed separately and in the jurisdiction where it is situated. In order to be consistent the assessor should give careful consideration to the relationship between the value at which such tangible property is carried on the books of the bank and the value at which it is assessed. For instance, suppose a bank's capital, surplus and undivided profits is $1,000,000 and that it carries on its books real estate, all situated in the county where the bank is located. If the value at which this real estate stands on the books of the bank is $200,000, then the amount at which the stock of the bank will be assessed is $800,000. Suppose that this real estate is assessed at $100,000. The total assessment of the bank will then be $900,000, while its capital stock, surplus and undivided profits is $1,000,000. The stockholders of the bank so situated would get the benefit of a reduction of the book value of their stock for assessment purposes in the amount of $100,000, this being an overstatement on the books, of the value of the real estate. On the other hand, if the real estate were assessed at $300,000, the total assessment of the bank would be $1,100,000. The bank would then be paying taxes on $100,000 more than the book value if their capital stock, surplus, and undivided profits, the difference being an understatement of the real estate value in the books of the bank. The importance of this matter is emphasized in cases which are quite common among banks, where bank furniture and fixtures or even the bank building is carried at zero or a nominal figure in the bank's books. In all such cases as this the assessor should deduct from the capital stock, surplus and undivided profits value of the real estate, regardless of the assessed value.

Court Records.—Court records are the source of valuable information for the assessor. Inventories of estates filed for probate are available and should be systematically examined and the assets which are revealed thereby should be assessed. It will be found that many a testator will leave a substantial amount of taxable intangible property, although nothing has subsequently appeared on his tax return. It is sometimes contended that it is unfair to take this means of taxing widows and orphans. This argument will not hold good, for the reason that it is only the evidence that the decedent had failed to make returns and pay taxes which were legitimately due the government during his lifetime. By assessing the estate on these intangibles, for the period they are in the estate, the government will not receive all it is entitled to because the tax which should have been levied during the several years preceding the death of the testator had never been paid. Another court record that is a source of valuable information for the assessor is the statement of assets filed by bondsmen.

Deductions.—Wherever intangible property is taxed, an allowance is made for the deduction of debts; therefore, a brief consideration of the subject of deductible debts is in order.

Unfortunately, state laws are not always consistent on this subject. Some states have laws requiring the cash of the taxpayer to be averaged for the year ending on a certain date, providing, at the same time, for the deduction of debts outstanding at the close of the year only. There is a very close relationship between bank balances and borrowed money. A company may be a heavy borrower during a considerable portion of the year, and during that period its bank balances will be large, but at the end of the year it may have all these debts liquidated. In such a case the taxpayer will be assessed heavily on his average cash balance but will have nothing to deduct therefrom.

On the other hand, he may be a small borrower most of the year, but at the particular season when the tax year ends, he is a heavy borrower, in which case the indebtedness of the taxpayer will be more than his average cash balance, which is unfair to the government. If cash is averaged, debts should be averaged.

All debts are not properly deductible. Debts incurred for the purpose of purchasing exempt assets are not deductible. Taxes have been declared by the courts not to be debts in the legal sense of the word and, therefore, taxes should not be included among deductible debts.

Intangible property presents a difficult problem from the standpoint of taxation due to the lack of uniformity of laws among the several states.

In considering the foregoing discussions, the assessor should always think of them in relation to his own situation under the laws of his own state. The attempt has been made to discuss these things from a philosophical viewpoint. It is hoped the thoughts presented will be helpful to many assessors in the administration of their offices the securing of better tax through legislation.

CHAPTER XXVI

THE APPRAISAL OF MOTOR VEHICLES

Uniformity of Valuation the Important Goal.—The personal inspection of motor vehicles, especially in cities, is an almost impossible task; and, even if it were possible to inspect all cars, it would be difficult indeed to get appraisals from all the deputy assessors that would be equal on the same kind of automobile. The real condition of a car is hidden under the hood, and even experienced mechanics have difficulty in determining just what the car is worth. This is proved by the variety of prices that will be quoted on the same machine when it is offered to several dealers of used cars.

Here, as in the case of the assessment of all other classes of property, the important thing is to assess all owners the same on the same kind of car.

Resale Value vs. Utility Value.—There are many different views of value as applied to motor cars. If a new car is purchased, it has become a used car as soon as it is driven out of the store; and if it is resold by the owner, it will be at a price less than he paid the dealer. This, however, does not represent the real value of the car. Actually, an automobile is worth more after it has been driven two or three thousand miles than it was the moment it was driven out of the dealer's store. From a utility standpoint it has increased in value instead of decreased, but from a sales standpoint it has decreased. The question arises, then, as to what basis should be used for the appraisal of automobiles.

Blue Book Values.—The automobile industry issues what is known as the "Automobile Blue Book." This book contains prices for used cars of all makes and is issued by the automobile associations in an attempt to standardize used-car prices, the prices quoted therein being those the automobile associations consider fair to the dealer to pay for a used car when taken in exchange for a new one. The blue book prices possess the virtue of uniformity, but all assessors are not willing to take the prices as a fair value for purposes of assessment.

Original Cost as a Basis of Assessment.—Some states have adopted the policy of making up a schedule of discounts to be applied to the new cost price of all makes of automobiles, the rates of discount increasing as the machine grows older. The Colorado 1930 schedule of discounts is shown in Table 205.

TABLE 205.—DEPRECIATION OF AUTOMOBILES

Year	Percentage of list price
1	30
2	50
3	70
4	80
5 and so long as used	90

So long as the car is in use the maximum depreciation is 90 per cent unless in the opinion of the appraiser it is worthless. When the "make" of a car is no longer manufactured, the judgment of the appraiser should govern in determining the value. Table 206 gives the annual rate of depreciation for "orphan" cars.

TABLE 206.—DEPRECIATION OF ORPHAN CARS

Year	Percentage of last list price
1	50
2	70
3	80
4	90

Extraordinary Cases.—Wherever a system such as described above is used, it must be remembered that it can be used only as a standard. In practically all cases the established schedule of discounts will be equitable and will be fair to the taxpayer with equality of assessment assured, but a request by the taxpayer for special consideration should always be given attention. If he claims that his car is not worth as much as the amount set

by the assessor, his position is not well taken unless his car is in worse condition than the average car of that make, style and age. If he can prove that it is in worse condition than the average, allowance should be made.

Appraisal of Automobiles.—Table 207 gives a number of examples of the 1930 valuations of automobiles for use in the Denver assessor's office. Space does not permit giving the data on every make of automobile.

TABLE 207.—DENVER (1930)—ASSESSED VALUE OF HUDSON AND PACKARD AUTOMOBILES

Make	Type	Pass.	1924	1925	1926	1927	1928	1929	1930
HUDSON	Coach	5	30	60	120	240	350	590	830
118 & 119" W. B.	Std. Sedan	5	30	60	130	260	380	640	900
	Coupe	2	30	60	120	250	370	620	860
	Roadster	4	40	70	130	270	400	670	930
	Phaeton	5	40	70	140	290	430	720	1,000
	Sun Sed	5	40	70	150	290	440	730	1,030
	Town Sed	5							
126 & 127" W. B.	Touring Sed	5	40	70	140	280	410	690	970
	Brougham	5	40	70	140	290	430	710	1,000
	Phaeton	7	40	80	170	330	500	830	1,160
	Sedan	7	50	90	180	360	530	890	1,250
	Landau Sed	5	50	80	160	330	490	820	1,140
	Victoria, W. W.	4							
	Con. Coupe	4	40	80	160	320	470	790	1,110
HUDSON SPEC.	Spt. Sedan	5	50	100	200	400	590	990	1,390
	Sedan	7	50	110	210	430	640	1,070	1,490
	Limousine	7	60	110	220	450	670	1,120	1,560
PACKARD Standard 8 Cyl. 127½" W. B. 726	Sedan	5	70	130	260	530	790	1,320	1,840
134½" W. B. 733	Touring	7	70	130	270	540	800	1,340	1,870
633–626	Phaeton	5	70	130	260	520	770	1,290	1,800
	Sport Phaet	5	70	140	290	580	860	1,440	2,010
	Runabout	4	70	130	260	520	770	1,290	1,800
	Convt. Coupe	2	70	140	270	540	810	1,350	1,890
Wire Wheels $110 Extra	Coupe	2	70	130	270	540	800	1,340	1,870
	Coupe	5	70	140	280	570	850	1,410	1,980
	Club Sed	5	70	140	280	570	850	1,410	1,980
	Sedan	7	80	150	290	590	880	1,470	2,050
	Sedan Lim	7	80	150	300	610	910	1,520	2,120
Standard 6 Cyl. 526–533	Touring	7	60	130	250	500	760	1,280	1,820
	Coupe	4							
	Club Sed	5	70	130	260	520	780	1,300	1,850
	Sedan	7							
	Coupe	2							
	Convt. Coupe	2	60	120	240	480	740	1,250	1,780
	Sed. & Phaet	5							
Custom Eight	Sedan	5	100	190	370	750	1,120	1,870	2,610
140–140½" W. B.	Touring	7	90	170	350	700	1,040	1,740	2,430
443–640–740	Phaeton	5	90	170	330	670	1,000	1,670	2,340
	Spt. Phaet	5	90	180	360	730	1,090	1,820	2,550
	Runabout	4	90	170	330	670	1,000	1,670	2,340
	Convt. Coupe	2	90	180	350	700	1,050	1,750	2,450
	Coupe	2	90	170	340	690	1,030	1,720	2,410
	Coupe	5	100	190	380	760	1,140	1,900	2,660
	Club Sedan	5	100	200	390	780	1,170	1,950	2,730
	Sedan	7	100	200	390	790	1,180	1,970	2,750
	Sed. Lim	7	100	200	400	810	1,120	2,020	2,820
745	Sedan	5	130	260	510	1,030	1,540	2,570	3,590
	Touring	7	120	240	470	950	1,420	2,370	3,310
	Phaeton	5	120	240	470	950	1,420	2,370	3,310
	Spt. Phaet	5	130	250	500	1,010	1,510	2,520	3,520
	Convt. Coupe	2	130	250	500	1,010	1,510	2,520	3,520
	Runabout	4	120	240	470	950	1,420	2,370	3,310
	Coupe	2	130	250	490	990	1,480	2,470	3,450
	Coupe	5	130	260	530	1,050	1,580	2,630	3,680
	Club Sedan	5	140	270	530	1,060	1,590	2,650	3,710
	Sedan	7	140	270	530	1,070	1,600	2,670	3,730
	Sedan Lim	7	140	280	550	1,100	1,650	2,750	3,850

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